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Integrated TMDL Watershed Approach and Tools

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Integrated TMDL Watershed Approach – Steps and Process

The Integrated TMDL Watershed Approach is a holistic, multi-pollutant approach to watershed activity planning and implementation which consists of an iterative four component process of 1) *Initial Assessment*, 2) *Planning*, 3) *Implementation*, and 4) *Effectiveness Assessment/Re-assessment* (Figure 1). Each component of this approach includes planning tools which helped Dischargers develop and select TMDL watershed activities, a framework for implementation, and an assessment process. Each component was also divided in steps, as described in this Appendix. A schematic of the stepped process and associated planning tools which make up the Integrated TMDL Watershed Approach is presented in Figure 2.

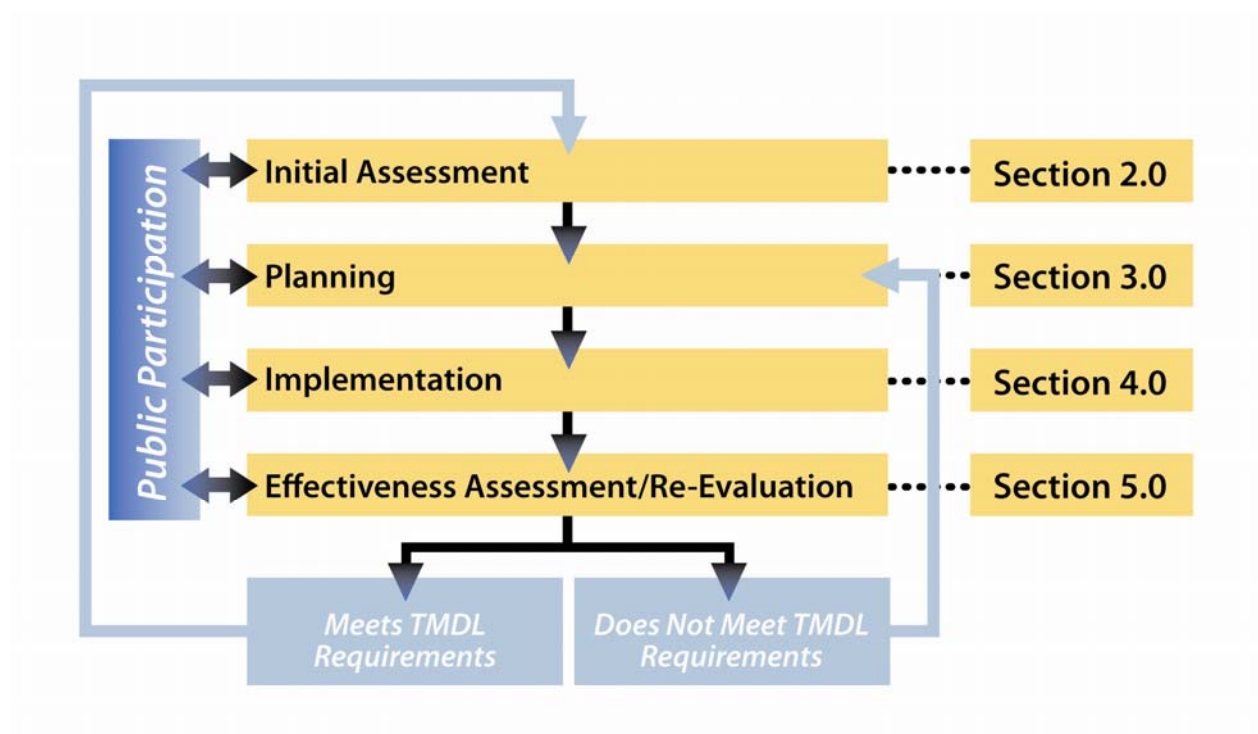


Figure 1. Integrated TMDL Watershed Approach to Meeting the Dissolved Metals TMDL in the Chollas Creek Watershed

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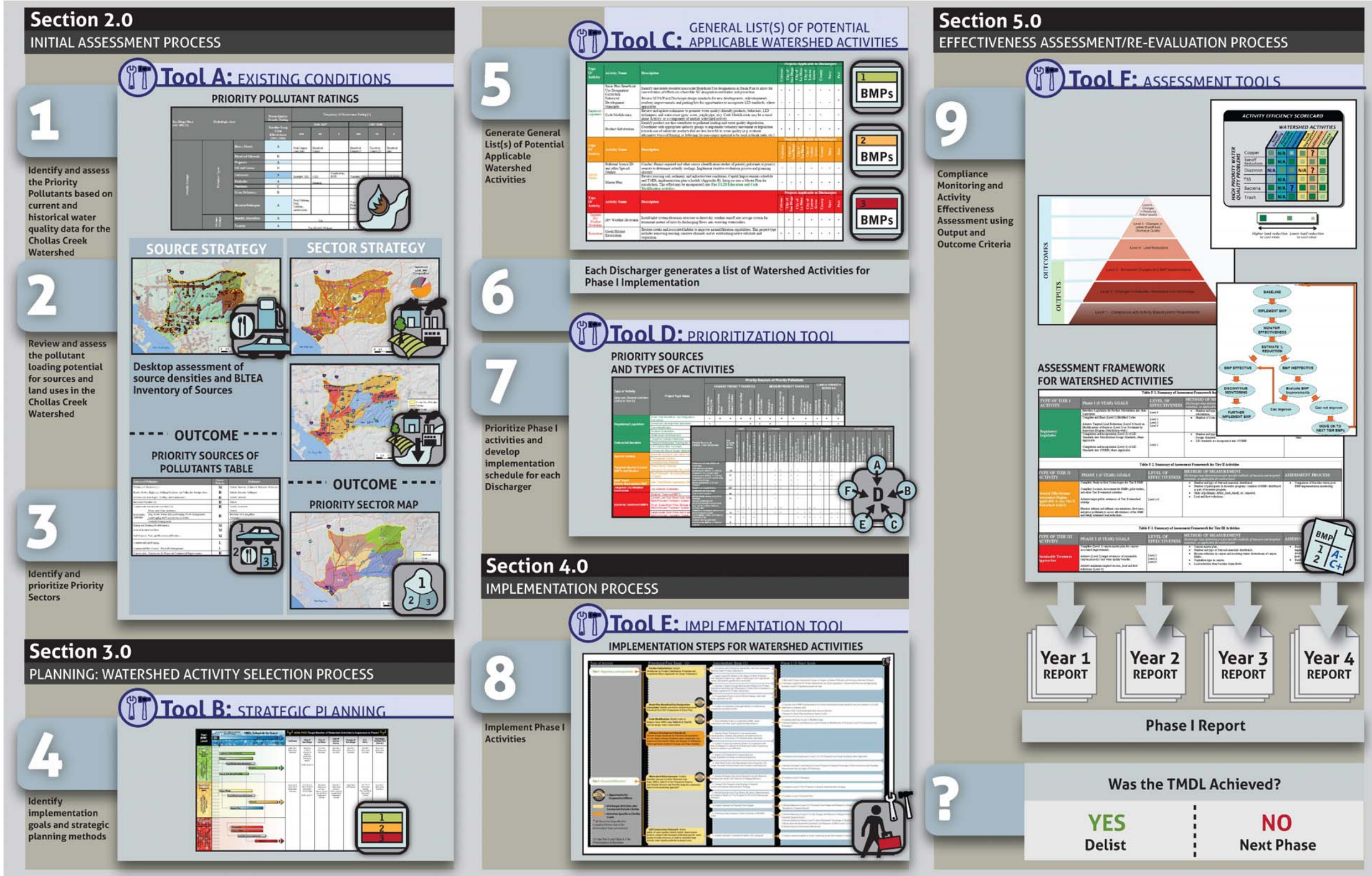


Figure 2. Integrated TMDL Watershed Approach – Steps and Planning Tools

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The first three steps of the Integrated TMDL Approach correspond to the *Initial Assessment* component of the Integrated TMDL Watershed Approach (Section 2 of the Implementation Plan and Tool A). These steps consisted of collecting, compiling, and assessing chemical, physical and biological water quality data and then identifying data gaps and prioritizing priority water quality problems (PWQP).

STEP 1: IDENTIFY AND ASSESS THE PRIORITY POLLUTANTS BASED ON CURRENT AND HISTORICAL WATER QUALITY DATA FOR THE CHOLLAS CREEK WATERSHED

IDENTIFY, REVIEW, AND ASSESS WATER QUALITY DATA

Use available historical and current water quality data from various monitoring programs, special studies, and technical reports for the metals and bacteria TMDLs and other regulatory drivers.

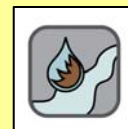
OUTCOME: Understanding of data and data gaps which need to be addressed through special studies to (potential Tier II watershed activity).



IDENTIFY, REVIEW, COMPILE, AND UPDATE PRIORITY RATINGS

- Use the Water Quality Priority Ratings developed using the BLTEA process for the Chollas Creek Watershed.
- Use the Frequency of Occurrence (diamond ratings) developed using the “Triad” process for wet and dry weather, toxicity, bioassessment, and sediment data that is presented in the San Diego Copermittees Monitoring Report.
- Combined the Water Quality Priority Ratings and Diamond Rating to develop a Water Quality Ratings Table.

- **OUTCOME:** The two water quality ratings were combined in Table A-1: Water Quality Ratings.



DEVELOP A LIST OF PWQP BASED ON THIS ASSESSMENT OF DATA, RATINGS AND REGULATORY DRIVERS

OUTCOME: Priority Water Quality Problems for the Receiving Waters of the Chollas Creek Watershed (Table 2-1).



The Water Quality Priority Ratings represent long-term conditions in the San Diego Mesa Hydrologic Area (HA) 908.20 between 2001 and 2006. The Chollas Creek Watershed is dominant subwatershed within HA 908.20 and most of the monitoring data collected for the HA is from sites SD8(1) and DPR2, the two MLS compliance points in this watershed. The Water

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Quality Priority Ratings used in this Implementation Plan were determined in 2006. These ratings are updated every five years and are scheduled to be updated in 2012, after Phase I is complete (Weston, MOE & LWA, 2005).

The Frequency of Occurrence or “diamond” ratings were developed using a Triad process that considered not only the wet and dry weather water quality results, but also toxicity, bioassessment, and sediment data collected each year under the San Diego Copermittees Monitoring Program (Weston, 2008). During the 2007-2008 monitoring period, it was determined that total metals were no longer appropriate indicators of the water quality conditions in the Chollas Creek Watershed. Additional emphasis was placed on dissolved metals. Therefore ambient monitoring was added to the San Diego Copermittee Monitoring Program during the 2007-2008 reporting period. Due to this procedural change it was not possible to directly compare the 2006-2007 and 2007-2008 ratings. Therefore, the Water Quality Ratings Table (Table A-1) presents all water quality parameters assigned a diamond rating and is not limited to the high occurrence (three diamond) water quality parameters. Table A-1 form the basis for the PWQP identified in this Implementation Plan.

STEP 2: REVIEW AND ASSESS THE POLLUTANT LOADING POTENTIAL FOR SOURCES AND LAND USES IN THE CHOLLAS CREEK WATERSHED

The second step of the *Initial Assessment* involves the review and assessment of pollutant loading potential from sources and land uses in the Chollas Creek Watershed. The description of this process was subdivided into three sub-steps (2A, 2B, and 2C) according to the type of assessment and the subject of assessment. Although distinguished in this document to ensure all avenues have been explored, these three sub-steps were conducted in parallel.

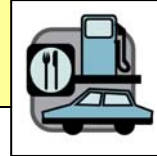
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STEP 2A: REVIEW AND ASSESS SOURCES OF PWQP AND/OR SOURCES WHICH ARE A HIGH THREAT TO WATER QUALITY

SPATIAL ASSESSMENT OF POTENTIAL SOURCES OF PWQP

Identify and mark “clusters” of potential sources for each group of PWQP (use Table 2-1, and Tables A-2 to A-5). Consider the sources of many kinds of PWQP in an integrated approach.

OUTCOME: Priority Pollutant Source Map (Figure A-3).



DETERMINE THE HIGH PRIORITY SOURCES OF POLLUTANTS

Use the Threat to Water Quality (TTWQ) ratings, the Source Loading Potential ratings, and the number of sources in the Chollas Creek Watershed to rank sources. Use the Potential Sources and Loading Potential Rating tables (BLTEA Inventory of Sources).

OUTCOME: Priority Sources of Pollutants List (Table A-6) and Priority Sources Applicable to Each Discharge Table (Table A-7).



Understanding the number and location of sources of priority pollutants is important for the San Diego Copermittees’ to evaluate their programs. While developing the BLTEA report, Copermittees compiled information on types of establishments, activities, and facilities from numerous resources to obtain as accurate an estimate as possible of the number of sources throughout San Diego County (Weston, MOE & LWA, 2005). Once the priority pollutants in the Chollas Creek Watershed were identified (Step 1), the Inventory of Sources for trace metals, bacteria, and pesticides for the San Diego Bay watershed, of which Chollas Creek is part, were analyzed (Weston, MOE & LWA, 2005). These sources were prioritized according to:

- TTWQ, ranging from a highest priority of T1 to a lowest priority of T6.
- Source loading potential (likely sources were selected over unknown, unlikely, or negligent sources).
- Number sources within the watershed.

Higher priority was given to sources of heavy metals and bacteria over other PWQP and to sources of multiple PWQP over single sources. This Implementation Plan has identified twelve groupings of priority sources which are listed in the Priority Sources of Pollutants Table (Table A-6). The locations of these potential sources that have been geo-coded in the County of San Diego’s database have been graphically represented in the Map of Sources of Priority Pollutants (Figure A-1).

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STEP 2B: REVIEW AND ASSESS LAND USE AND RESTORATION OPPORTUNITIES

CREATE, REVIEW, AND ASSESS LAND USE MAP(S)

Review maps of and natural resources within the Chollas Creek Watershed. Consider open space, high value habitat, and opportunities for restoration.

OUTCOME: Land Use Map (Figure A-4).



IDENTIFY OPPORTUNITIES FOR INTEGRATING WATER QUALITY IMPROVEMENT PROJECTS WITH HABITAT RESTORATION

OUTCOME: Potential Tier III Watershed Activity.

STEP 2C: DETERMINE POLLUTANT LOADING IN THE CHOLLAS CREEK WATERSHED

DEVELOP POLLUTANT LOADING MODEL

Develop a pollutant loading model based on PWQP, land use, and sources of pollutants.



CALIBRATE POLLUTANT LOADING MODEL

Calibrate model with existing data. Evaluate to identify data gaps.

OUTCOME: Metals Pollutant Loading Map (Figure A-3).
Understanding of data/data gaps (potential Tier II special study).



During development of the Dissolved Metals TMDLs, the Chollas Creek Watershed was divided into subwatersheds (Figure 3). The loading from each subwatershed was estimated using land use and parameter values calibrated for the watershed model used in the TMDL. Loadings were presented as relative annual loadings (relative to each other) and normalized loadings per acre for each parameter. The relative loadings for dissolved copper, lead, and zinc were not uniform across the Chollas Creek Watershed and higher loads were characterized due to land use. Therefore, the Metals Pollutant Loading Map (Figure A-3) is a land use-based planning tool which characterizes loading as high, medium, or low.

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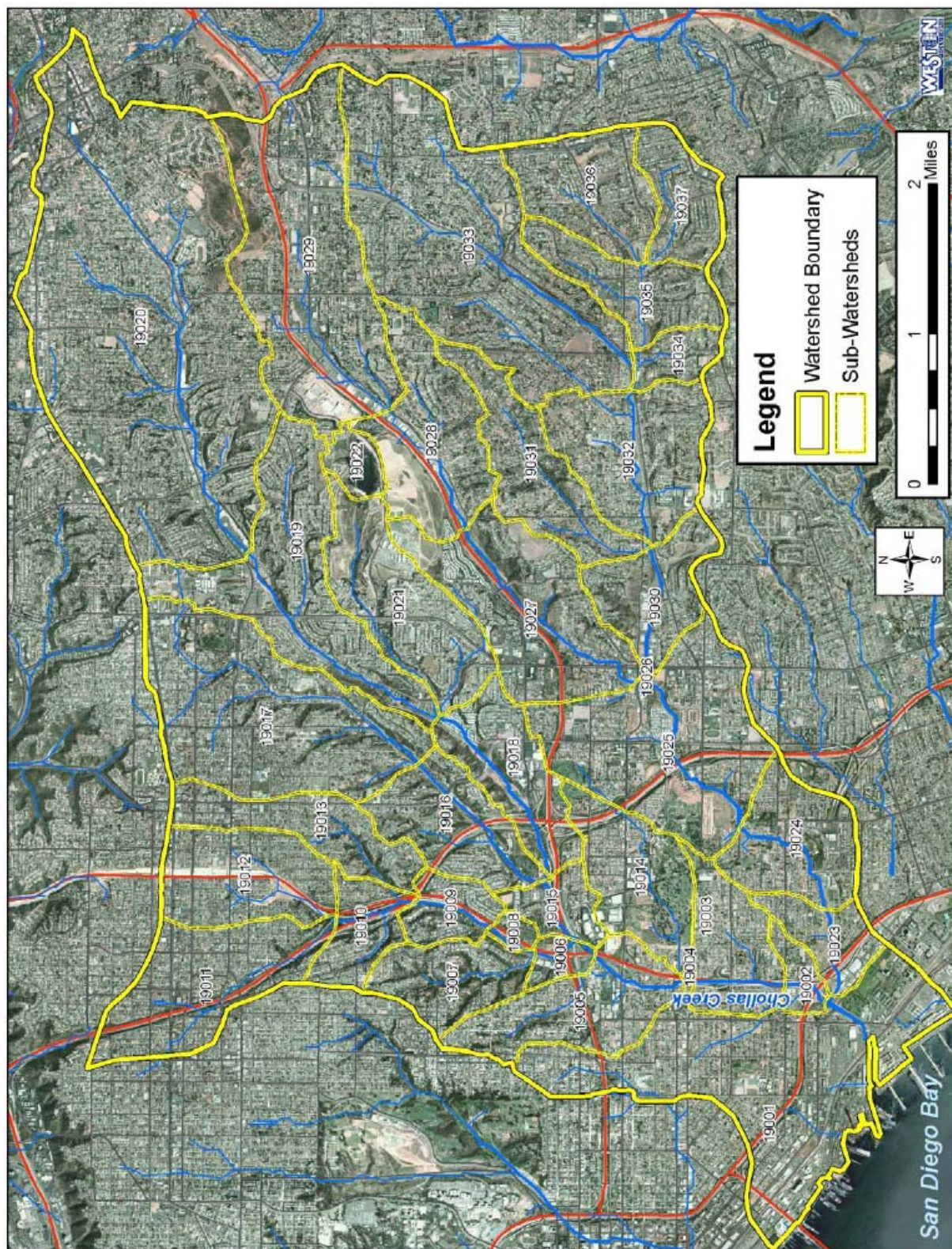


Figure 3. Chollas Creek Sub Watershed Boundaries

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STEP 3: IDENTIFY AND PRIORITIZE PRIORITY SECTORS

IDENTIFY SECTORS TO PRIORITIZE PHASE I WATERSHED ACTIVITIES

Delineate Chollas Creek Watershed into subwatersheds. Consider factors such as PWQP (Table 2-1), sources of pollutants (Figure A-1, Table A-6, and Table A-7), land uses (Figure A-2), and metals loading (Figure A-3).



DEVELOP A MAP OF THE PRIORITY SECTORS

Divide Chollas Creek Watershed into ~ 5 priority sectors. Assign each sector a numeric value (1 = sector with highest relative priority).

OUTCOME: Priority Sector Map (Figure A-6). A Discharger may choose to create an individual Priority Sector Map to aid in the Planning process.

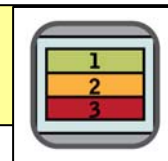


Steps 4 through 7 of the Integrated TMDL Watershed Approach correspond to watershed activity *Planning*. This watershed activity selection process builds upon the existing conditions data compiled during the *Initial Assessment* and results in Dischargers completed a List of Watershed Activities for Phase I Implementation.

STEP 4: IDENTIFY IMPLEMENTATION GOALS AND STRATEGIC PLANNING METHODS

DEVELOP GOAL POSTS

Identify the target number of watershed activities to be implemented during the first five years of the Implementation Plan (Figure B-1).



IDENTIFY APPLICABLE STRATEGIC PLANNING METHOD(S)

- Conduct desktop review of jurisdictional boundaries, the Priority Pollutant Source Map (Figure A-1), Priority Source List (Table A-6), and Sector Map (Figure A-4).
- Evaluate which planning method would be most applicable (use the Strategy and Tool Matrix).

Dischargers set a “goal post” or a target number and tier of watershed activities to be implemented in the first phase of the Implementation Plan. These goal posts function as a reality check and feasibility check on a Discharger’s proposed List of Watershed Activities. Dischargers also selected one of three watershed activity identification and selection processes: source,

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sector, and other selection strategies. The Source Strategy focuses BMP implementation efforts towards specific activities and/or businesses considered which are to be major sources of PWQP. This is usually linked to Tier I and Tier II BMPs. The Sector Strategy is more diverse than the Source Strategy and involves implementing BMPs which target priority sectors. This Strategy takes into account high density areas of priority sources, high priority metals loading areas, and land uses. The “Other” Strategy does not target a specific geographic source, activity, or location, but rather implements regional policy changes to reduce pollutant loading. The link between the BMP tiers, the planning tools, and these strategies is defined in the Strategy and Tool Matrix (Table 1).

For example, Tier I Source Control and Pollution Prevention BMPs are generally linked to identified sources of pollutants. Therefore, as listed in Table 1, Dischargers should use the priority source list(s) (Table A-6 and Table A-7) to identify the Tier I BMP that provides the most benefit in Phase I. Furthermore, for Tier II and Tier III BMPs, Table 1 recommends using the Sector Map (Figure A-4) to help to prioritize locations for structural BMPs in drainage areas that have the greatest pollutant load potential. Step 4 therefore enables Dischargers to identify the target number and type (tier) of watershed activities and the planning tool under Tool A to use in identifying and prioritizing BMPs for each of the three tiers.

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Table 1. Matrix of Strategic Planning Methods and Planning Tools

DISCHARGER'S STRATEGY FOR IMPLEMENTING BMP'S WITHIN JURISDICTION						
		SOURCES	SECTORS	OTHER		
Definition of Strategy		Implement BMPs which target specific sources (activities and land uses) considered to be major sources of pollutants.	Implement BMPs which target both sources and locations of pollutants by using the watershed level Priority Sectors map (or Discharger specific Sector map).	Implement regional policy changes which target sources of pollution.		
		Sources Map	Sources Map Land Use Map Pollutant Loading Map	Sources Map		
	Tool A: EXISTING CONDITIONS TOOL	OUTCOME: Priority Sources of Pollutants (Table A-6), Priority Sources Applicable to Each Discharger (Table A-7)	OUTCOME: Priority Sector Map (Figure A-4)			
	Tool B: STRATEGIC PLANNING TOOL	Discharger's Goal Posts for Watershed Activity Implementation				
	Tool C: GENERAL LIST of POTENTIAL, APPLICABLE ACTIVITIES TOOL	Tier I Activities (Table C-1)	Tier I Activities (Table C-1) Tier II Activities (Table C-2) Tier III Activities (Table C-3) (implement as applicable, as pilot studies during Phase I of Implementation Plan process)	Tier I Activities: Regulatory/Legislative		
	Tool D: PRIORITIZATION TOOL	Priority Sources and Types of BMPs Table (Table D-1) Basic BMPs (Table D-2)	Priority Sources and Types of BMPs Table (Table D-1) Basic BMPs (Table D-2)	Priority Sources and Types of BMPs Table (Regulatory/Legislative)		
	Tool E: IMPLEMENTATION TOOL	Implementation Steps (Table E-1) Implementation Steps for Tier II and Tier III activities, as applicable	Implementation Steps (Table E-1) Implementation Steps (Table E-2) Implementation Steps (Table E-3)	Implementation Steps: Regulatory/Legislative		
Tool F: ASSESSMENT TOOLS	Effectiveness Assessment/ Re-Evaluation Process (Table F-1) Assessment of Tier II and Tier III activities, as applicable	Effectiveness Assessment/ Re-Evaluation Process (Table F-1) Effectiveness Assessment/ Re-Evaluation Process (Table F-2) Re-Evaluation Process (Table F-3)	Effectiveness Assessment/ Re-Evaluation Process: Regulatory/Legislative			
PLANNING TOOLS						

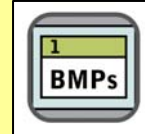
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STEP 5: GENERATE GENERAL LIST(S) OF POTENTIAL APPLICABLE WATERSHED ACTIVITIES

REVIEW AND ASSESS THE APPLICABILITY OF WATERSHED ACTIVITIES IN THE GENERAL LIST(S) OF ACTIVITIES

The General List(s) of Activities is a planning tool which compiles ALL potential watershed activities the seven Dischargers in the Chollas Creek watershed could implement. This tool is used for project brainstorming.

OUTCOME: TOOL C: General List(s) of Potential Applicable Watershed Activities.



RE-EVALUATE AND UPDATE GENERAL LISTS OF ACTIVITIES, as applicable

Step 5 of the *Planning* component results in the development of the General List(s) of Potential Applicable Watershed Activities (Tool C) for each Tier of BMPs. This General List of Potential Applicable Watershed Activities is consistent with the City of San Diego's 5-Year Watershed Activity Strategic Plan, but has been modified to include activities and descriptions that are applicable to all the seven Dischargers listed under the Dissolved Metals TMDL. Tool C also identifies which watershed activities are applicable to each Discharger. Not all of these activities can, nor should they, be implemented by each Discharger. Further more, not all activities have been assigned to each Discharger. For example:

- Tier I Education and Community Outreach activities would not be applicable to the Navy, since civilians do not have access to this area. Targeted Behavioral Training would be a more appropriate activity.
- Caltrans, the Navy, and the County of San Diego could not, nor need to implement Tier II Targeted Mobile Hazardous Waste Household Collection Centers. The City municipalities would be in a better position to do so (as would the Port of San Diego, in a slightly modified context).
- The City of San Diego and possibly the Navy would remove kelp along the mouth of Chollas Creek. Only these Dischargers would be expected to implement this Tier II activity.

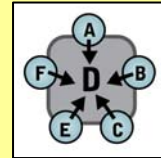
Dischargers also identified watershed activities and special studies appropriate for new or expanded cooperative efforts and data sharing. Emphasis was placed on cooperative source identification studies and data sharing for pilots such as behavioral based social marketing, LID (Tier II), and treatment/restoration BMPs (Tier III). Tool C was provided to the Dischargers and stakeholders for review and comment. Additional watershed activities were added based this input. As indicated in the re-evaluation and update step, this General List may need to be updated before used to plan the implementation of future phases.

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STEP 6: DEVELOP LIST OF WATERSHED ACTIVITIES FOR PHASE I IMPLEMENTATION

IDENTIFY WHICH TYPE(S) OF WATERSHED ACTIVITIES ARE APPROPRIATE FOR PHASE I IMPLEMENTATION

- Source Strategy: Using the Strategy and Tool Matrix, identify the categories of watershed activities which would be appropriate to implement. Create this list according to source priority.
- Sector Strategy: Identify relevant high priority sectors. Then determine the priority pollutants and priority sources of PWQP within each priority sector (list should be ranked by priority sector). Implement source strategy (above) for each priority sector.
- Other Strategy: Are there regulations prohibiting or limiting implementation of a watershed activity? Is a universal change in policy required (product ban, product substitution, legislative approach through air quality monitoring, etc)? Identify possible regulatory/ legislative changes from the list of Tier I Regulatory/ Legislative activities.

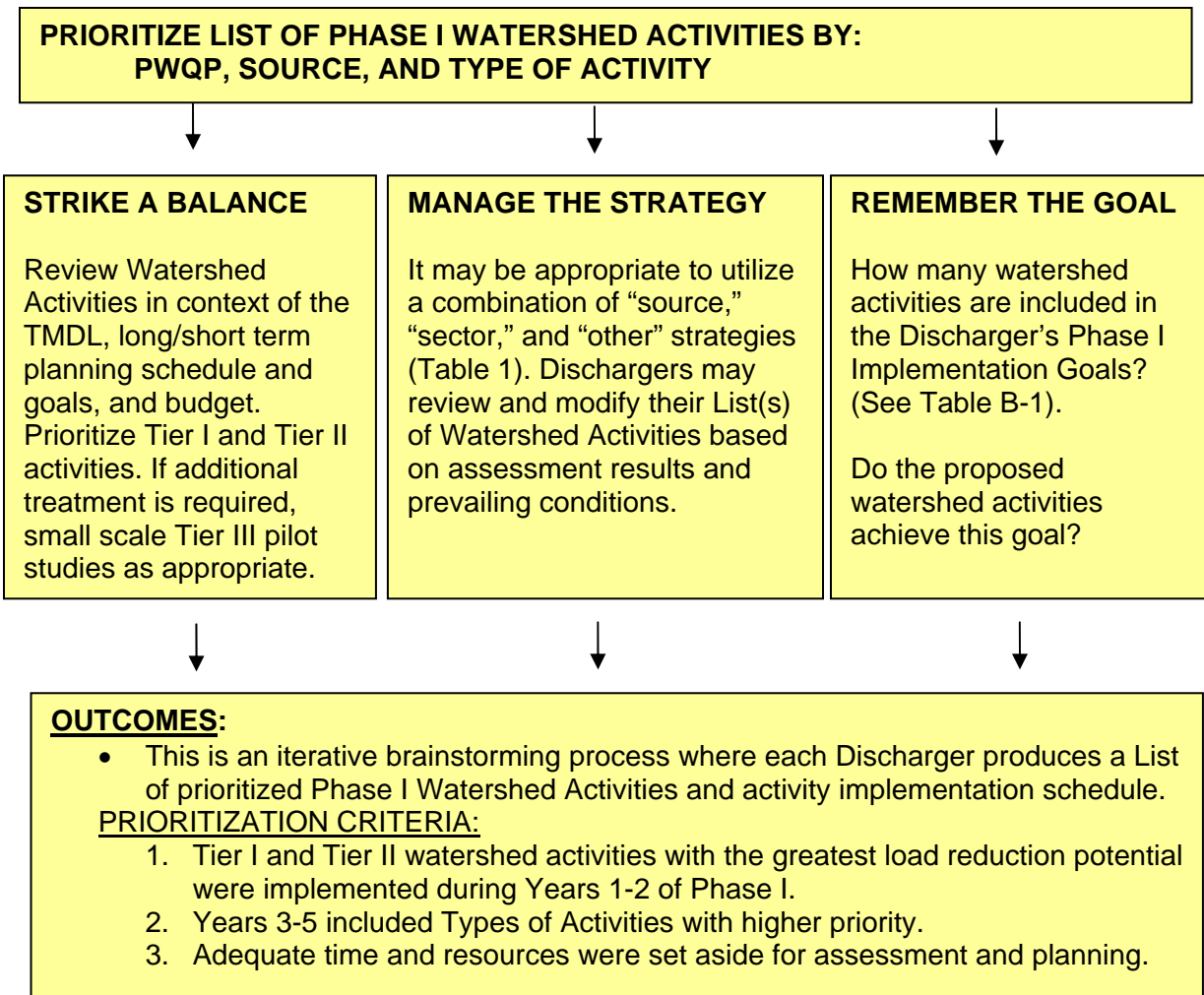


OUTCOME: Dischargers produce a List of Watershed Activities for Phase I Implementation and meet the “goal post” target number of activities set during Step 4.

Each Discharger was responsible for developing a List of Watershed Activities for Phase I Implementation (Appendix B). This working document describes each Discharger’s plan for meeting the WQOs of the Dissolved Metals TMDL. Based on the availability of resources, site conditions, permitting requirements, and outcomes of watershed activity assessments, the type and location of the watershed activities may change.

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STEP 7: PRIORITIZE PHASE I WATERSHED ACTIVITIES



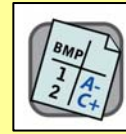
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STEP 8: IMPLEMENT PHASE I ACTIVITIES

COMPLETE WATERSHED ACTIVITY PLANNING, PERMITTING, AND DESIGN

In addition to location, permits, and conceptual/structural design, a watershed activity should have defined:

- Goals (see Tools E and F)
- Study question(s) (see Tool E)
- Methods of Measure, *collectable data that answer the study question(s)* (see Tool F)



IMPLEMENT ACTIVITIES

Dischargers should complete the prioritized first steps before implementing any intermediate steps. See flow charts in Tool E.

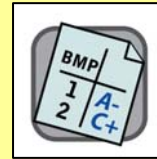


Steps 8 and 9 of the Integrated TMDL Watershed Approach are interconnected because the final planning and implementation of Tier I, Tier II, and Tier III watershed activities impacts how the project can be assessed. The watershed activity “scorecard” is one of the *Effectiveness Assessment/Re-Evaluation* planning tools developed in the Tool F Assessment Framework. The scorecard allows Dischargers to make management decisions by comparing activity scores (efficiency of different watershed activities normalized by its cost of implementation). Scores reported in the scorecard are based on the project-specific study questions. Therefore, setting an activity goal, determining narrow, answerable study question(s), and identifying collectable data which answer the question (methods of measure) are vital components of Implementation Process. Dischargers should complete this step before implementing the prioritized first implementation step(s) defined in Tool E.

Tool E was included in this Implementation Plan to enable watershed activity implementation. It consists of a series of flow charts which show the prioritized first steps (second column) and subsequent intermediate steps (column three) for implementing each watershed activity. Each watershed activity is also linked to a final goal (column four) which the activity strives to achieve at the end of the Phase I implementation cycle. Two types of activities have been identified: activities implemented within the Chollas Creek Watershed and activities implemented within and/or beyond the boundary of the watershed. The second type of activity allows Dischargers to share information and apply lessons learned on a broader scale to help improve water quality in the Chollas Creek Watershed. Although all watershed activities have potential Discharger-to-Discharger information sharing and partnering opportunities, activities where synergies are more prevalent have been highlighted.

STEP 9: COMPLIANCE MONITORING AND ACTIVITY EFFECTIVENESS ASSESSMENT USING OUTPUT AND OUTCOME CRITERIA

- What are you assessing? What are your assessment questions?
- Where will you obtain the data?
- How/From whom will you obtain the data?
- Is this a long term study, or can the questions be answered within one reporting year?



Reports should be developed in accordance with the Implementation Schedule. Phase I reporting occurs at the end of the Phase I. This report should include assessment of Phase I activities, recommendations for Phase II, and updates to the planning tools, as applicable.



Achieved the WLA s of the TMDL and able to begin the delisting process for the Chollas Creek Watershed.

The Effectiveness Assessment Monitoring Framework depends on the study questions assigned to each watershed activity by the Discharger during the Phase I planning. Study questions for each watershed activity should evaluate the project's effectiveness using the most simple and straightforward approach possible. This will reduce the number of variables in the assessment process and better connect methods of measurement to the goals and outcomes (see the Phase I

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(5-Year) Goals in right-most column of Tool E). Based on these activity specific goals, Dischargers modified the questions for effectiveness assessment. Examples of questions and how they are can be modified are presented in Tool F. The remaining assessment framework builds off the flow chart presented in Figure F-2. Dischargers used this framework as a guide for developing activity and phase specific assessment and monitoring plans. These effectiveness assessment plans should be incorporated into the watershed level water quality monitoring plan, as feasible.

Tool A

Existing Conditions

Chollas Creek Metals TMDL Implementation Plan



Table A-1. Water Quality Ratings

San Diego Mesa Hydrologic Area (HU 908.20)	Water Quality Priority Rating	Frequency of Occurrence Rating (1)					
		2006-2007			2007-2008		
	Baseline Long Term Effectiveness (2001-2006)	High ♦♦♦	Medium ♦♦	Low ♦	High ♦♦♦	Medium ♦♦	Low ♦
	Heavy Metals	Total Copper, Lead, Zinc	Dissolved Copper		Dissolved Copper (2)	Dissolved Copper (2)	Dissolved Zinc
	Dissolved Minerals						
	Organics						
	Oil and Grease						
	Sediments	Turbidity, TSS	COD	Conductivity, BOD	Turbidity, TSS		COD, BOD
	Pesticides		Diazinon				Diazinon
	Nutrients						
	Gross Pollutants						
	Bacteria/Pathogens	Total Coliform, Fecal Coliform, Enterococcus			Total Coliform, Fecal Coliform, Enterococcus		
	Benthic Alterations						
	Toxicity						

(1) The Diamond Ratings indicate the frequency of occurrence for constituents of concern. These are the criteria for evaluating mass loading and dry weather station data used by the San Diego Storm Water Copermittees to assess watershed quality from year to year. The criteria underlying the High, Medium, and Low ratings are defined in Table 4-3 of the *Watershed Data Assessment Framework* (MEC, 2004). Unless indicated otherwise, the reported water quality ratings are for the wet weather monitoring data which are the dominant factor in BMP design.

(2) Dissolved Copper received a three Diamond rating for Ambient Receiving Water Quality and a two Diamond rating for Wet Weather Receiving Water Quality.

(3) This rating is recommended to be raised to A based on recent trash monitoring results.

High Priority Based on Data

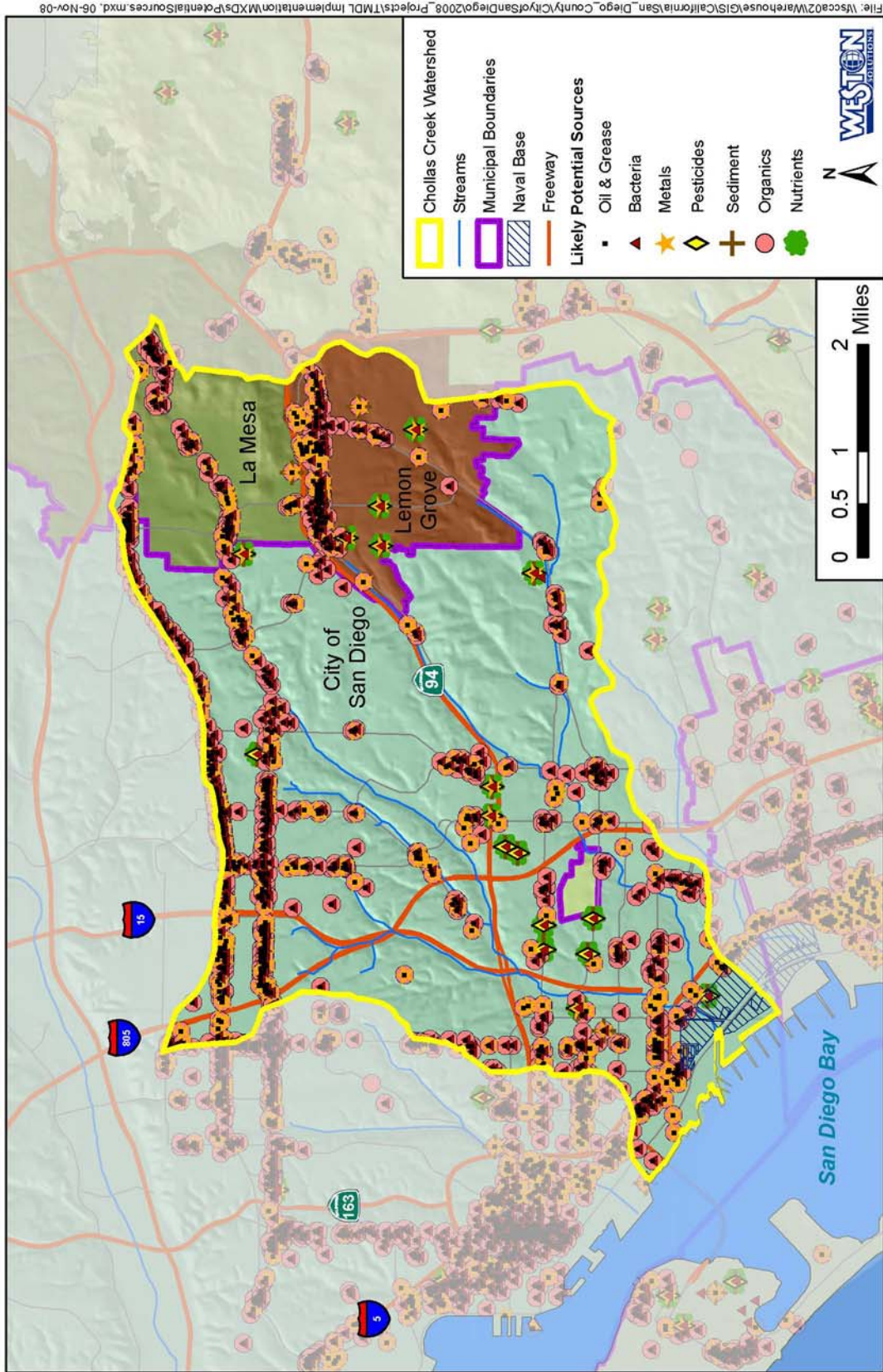


Figure A-1 Map of Sources of Priority Pollutants

Tool A: Existing Conditions*Chollas Creek Metals TMDL Implementation Plan*

Tables A-2 to A-5 show the Threat to Water Quality (TTWQ), the pollutant specific Loading Potential, and the number of sources for four of the priority pollutants in the Chollas Creek Watershed. The TTWQ rating is based on the actual water quality data for the watershed and the loading potential of each source for a particular constituent group (obtained from the BLTEA report). These tables were used to identify the twelve priority sources of pollutants listed in Table A-6.

Table A-2. Potential Sources of Indicator Bacteria and Loading Potential Ratings

Bacteria		# of Sources	Water Quality Priority	Source Loading Potential	TTWQ	Reduce loading to MEP	Evaluate and Identify Source Loading Potential	Confirm Source Loading Potential	No Action
Source ID	Source								
10	Eating or drinking establishments	3574	A	L	T1	X		X	
17	Animal Facilities	42		L	T1	X		X	
33	POTWs (water and wastewater)	29		L	T1	X		X	
14	Landscaping - parks, golf courses, cemeteries, etc.	27		L	T1	X		X	
13	Botanical or zoological gardens and nurseries/greenhouses	18		L	T1	X		X	
18	Home automobile associated activities, home and garden care activities, waste disposal	-		L	T1	X		X	
21	Roads, streets, highway, and parking facilities	-		L	T1	X		X	
34	Sites for disposing and treating sewage sludge	-		L	T1	X		X	
19	Development subject to SUSMPs	82		UK	T1	X	X		
30	Automobile wholesale	78		UK	T1	X	X		
32	Motor Freight	61		UK	T1	X	X		
16	Marinas	26		UK	T1	X	X		
29	Active or closed municipal landfills	8		UK	T1	X	X		
7	Auto parking lots and storage facilities	-		UK	T1	X	X		
9	Pest Control Services	40		UK	T1	X	X		
22	Flood management projects and flood control devices	-		UK	T1	X	X		
23	MS4s	-		UK	T1	X	X		
25	Park and Recreational facilities	-		UK	T1	X	X		
12	General contractors for home/commercial improvements (e.g. cement mixing, masonry, painting, etc.)	-		UL	T5	X		X	
20	Construction Sites	1674		UL	T5	X		X	
1	Auto mechanical repair, maintenance, fueling, or cleaning	724		UL	T5	X		X	
5	Automobile and other vehicle body repair and painting	112		UL	T5	X		X	
3	Boat mechanical repair, maintenance, fueling, or cleaning	59		UL	T5	X		X	
4	Equipment mechanical repair, maintenance, fueling, or cleaning	57		UL	T5	X		X	
27	Fabricated metal	51		UL	T5	X		X	
24	Corporate yards (incl. maintenance/storage yards)	24		UL	T5	X		X	
28	Primary metal	14		UL	T5	X		X	
2	Airplane mechanical repair, maintenance, fueling, or cleaning	9		UL	T5	X		X	
26	Chemical and allied products	5		UL	T5	X		X	
6	Mobile automobile or vehicle washing	-		UL	T5	X		X	
11	Mobile carpet, drape, or furniture cleaning	62		UL	T5	X		X	
8	Retail or wholesale fueling	227		N	T6				X
31	Airfields	1		N	T6				X
15	Pool and Fountain cleaning	49		N	T6				X

NOTES:

① Ranked by TTWQ and # of sources

② "F" signifies that no inventory information is available

③ All inventory is based on best available information

④ Inventory numbers for Source IDs 9, 11 and 15 are regional inventory numbers distributed across watersheds by percentage of land area

Table A-3. Potential Sources of Heavy Metals and Loading Potential Ratings

Heavy Metals		# of Sources	Water Quality Priority	Source Loading Potential	TTWQ	Reduce loading to MEP	Evaluate and Identify Source Loading Potential	Confirm Source Loading Potential	No Action
Source ID	Source								
1	Auto mechanical repair, maintenance, fueling, or cleaning	724	A	L	T3	X		X	
5	Automobile and other vehicle body repair and painting	112		L	T3	X		X	
30	Automobile wholesale	78		L	T3	X		X	
32	Motor Freight	61		L	T3	X		X	
3	Boat mechanical repair, maintenance, fueling, or cleaning	59		L	T3	X		X	
4	Equipment mechanical repair, maintenance, fueling, or cleaning	57		L	T3	X		X	
27	Fabricated metal	51		L	T3	X		X	
16	Marinas	26		L	T3	X		X	
24	Corporate yards (incl. maintenance/storage yards)	24		L	T3	X		X	
13	Botanical or zoological gardens and nurseries/greenhouses	18		L	T3	X		X	
28	Primary metal	14		L	T3	X		X	
2	Airplane mechanical repair, maintenance, fueling, or cleaning	9		L	T3	X		X	
6	Mobile automobile or vehicle washing	-		L	T3	X		X	
7	Auto parking lots and storage facilities	-		L	T3	X		X	
18	Home automobile associated activities, home and garden care activities, waste disposal	-		L	T3	X		X	
21	Roads, streets, highways, and parking facilities	-		L	T3	X		X	
8	Retail or wholesale fueling	227		UK	T3	X	X		
19	Development subject to SUSMPs	82		UK	T3	X	X		
33	POTWs (water and wastewater)	29		UK	T3	X	X		
29	Active or closed municipal landfills	8		UK	T3	X	X		
26	Chemical and allied products	5		UK	T3	X	X		
31	Airfields	1		UK	T3	X	X		
25	Park and Recreational facilities	-		UK	T3	X	X		
34	Sites for disposing and treating sewage sludge	-		UK	T3	X	X		
12	General contractors for home/commercial improvements (e.g. cement mixing, masonry, painting, etc.)	-		UL	T5	X		X	
20	Construction Sites	1674		UL	T5	X		X	
10	Eating or drinking establishments	3574		N	T6				X
17	Animal Facilities	42		N	T6				X
14	Landscaping - parks, golf courses, cemeteries, etc.	27		N	T6				X
9	Pest Control Services	40		N	T6				X
11	Mobile carpet, drape, or furniture cleaning	62		N	T6				X
15	Pool and Fountain cleaning	49		N	T6				X
22	Flood management projects and flood control devices	-		N	T6				X
23	MS4s	-		N	T6				X

NOTES:
 (1) Ranked by TTWQ and # of sources
 (2) * indicates that no inventory information is available
 (3) All inventory is based on best available information
 (4) Inventory numbers for Source ID 9, 11 and 15 are regional inventory numbers distributed across watersheds by percentage of land area

Table A-4. Potential Sources of Pesticides and Loading Potential Ratings

Pesticides		# of Sources	Water Quality Priority	Source Loading Potential	TTWQ	Reduce loading to MEP	Evaluate and Identify Source Loading Potential	Confirm Source Loading Potential	No Action
Source ID	Source								
14	Landscaping - parks, golf courses, cemeteries, etc.	27	A	L	T2	X		X	
13	Botanical or zoological gardens and nurseries/greenhouses	18		L	T2	X		X	
9	Pest Control Services	40		L	T2	X		X	
18	Home automobile associated activities, home and garden care activities, waste disposal	-		L	T2	X		X	
10	Eating or drinking establishments	3574		UK	T2	X	X		
19	Development subject to SUSMPs	82		UK	T2	X	X		
30	Automobile wholesale	78		UK	T2	X	X		
32	Motor Freight	61		UK	T2	X	X		
27	Fabricated metal	51		UK	T2	X	X		
17	Animal Facilities	42		UK	T2	X	X		
16	Marinas	26		UK	T2	X	X		
24	Corporate yards (incl. maintenance/storage yards)	24		UK	T2	X	X		
28	Primary metal	14		UK	T2	X	X		
29	Active or closed municipal landfills	8		UK	T2	X	X		
26	Chemical and allied products	5		UK	T2	X	X		
31	Airfields	1		UK	T2	X	X		
7	Auto parking lots and storage facilities	-		UK	T2	X	X		
22	Flood management projects and flood control devices	-		UK	T2	X	X		
25	Park and Recreational facilities	-		UK	T2	X	X		
34	Sites for disposing and treating sewage sludge	-		UK	T2	X	X		
12	General contractors for home/commercial improvements (e.g. cement mixing, masonry, painting, etc.)	-		UL	T5	X		X	
20	Construction Sites	1674		UL	T5	X		X	
1	Auto mechanical repair, maintenance, fueling, or cleaning	724		UL	T5	X		X	
5	Automobile and other vehicle body repair and painting	112		UL	T5	X		X	
3	Boat mechanical repair, maintenance, fueling, or cleaning	59		UL	T5	X		X	
4	Equipment mechanical repair, maintenance, fueling, or cleaning	57		UL	T5	X		X	
2	Airplane mechanical repair, maintenance, fueling, or cleaning	9		UL	T5	X		X	
6	Mobile automobile or vehicle washing	-		UL	T5	X		X	
21	Roads, streets, highways, and parking facilities	-		UL	T5	X		X	
8	Retail or wholesale fueling	227		N	T6				X
33	POTWs (water and wastewater)	29		N	T6				X
11	Mobile carpet, drape, or furniture cleaning	62		N	T6				X
15	Pool and Fountain cleaning	49		N	T6				X
23	MS4s	-		N	T6				X

NOTES:

- ① Ranked by TTWQ and # of sources
- ② * signifies that no inventory information is available
- ③ All inventory is based on best available information
- ④ Inventory numbers for Source ID 9, 11 and 15 are regional inventories distributed across watersheds by percentage of land area

Table A-5. Potential Sources of Sediment and Loading Potential Ratings

Sediment		# of Sources	Water Quality Priority	Source Loading Potential	TTWQ	Reduce loading to MEP	Evaluate and Identify Source Loading Potential	Confirm Source Loading Potential	No Action
Source ID	Source								
12	General contractors for home/commercial improvements (e.g. cement mixing, masonry, painting, etc.)	-	A	L	T1	X		X	
20	Construction Sites	1674		L	T1	X		X	
30	Automobile wholesale	78		L	T1	X		X	
17	Animal Facilities	42		L	T1	X		X	
14	Landscaping - parks, golf courses, cemeteries, etc.	27		L	T1	X		X	
24	Corporate yards (incl. maintenance/storage yards)	24		L	T1	X		X	
13	Botanical or zoological gardens and nurseries/greenhouses	18		L	T1	X		X	
6	Mobile automobile or vehicle washing	-		L	T1	X		X	
7	Auto parking lots and storage facilities	-		L	T1	X		X	
18	Home automobile associated activities, home and garden care activities, waste disposal	-		L	T1	X		X	
21	Roads, streets, highways, and parking facilities	-		L	T1	X		X	
22	Flood management projects and flood control devices	-		L	T1	X		X	
23	MS4s	-		L	T1	X		X	
8	Retail or wholesale fueling	227		UK	T1	X	X		
19	Development subject to SUSMPs	82		UK	T1	X	X		
32	Motor Freight	61		UK	T1	X	X		
27	Fabricated metal	51		UK	T1	X	X		
33	POTWs (water and wastewater)	29		UK	T1	X	X		
28	Primary metal	14		UK	T1	X	X		
29	Active or closed municipal landfills	8		UK	T1	X	X		
26	Chemical and allied products	5		UK	T1	X	X		
31	Airfields	1		UK	T1	X	X		
25	Park and Recreational facilities	-		UK	T1	X	X		
34	Sites for disposing and treating sewage sludge	-		UK	T1	X	X		
10	Eating or drinking establishments	3574		UL	T5	X		X	
1	Auto mechanical repair, maintenance, fueling, or cleaning	724		UL	T5	X		X	
5	Automobile and other vehicle body repair and painting	112		UL	T5	X		X	
3	Boat mechanical repair, maintenance, fueling, or cleaning	59		UL	T5	X		X	
4	Equipment mechanical repair, maintenance, fueling, or cleaning	57		UL	T5	X		X	
2	Airplane mechanical repair, maintenance, fueling, or cleaning	9		UL	T5	X		X	
11	Mobile carpet, drape, or furniture cleaning	62		UL	T5	X		X	
16	Marinas	26		N	T6				X
9	Pest Control Services	40		N	T6				X
15	Pool and Fountain cleaning	49		N	T6				X

NOTES:

- ① Ranked by TTWQ and # of sources
- ② "X" signifies that no inventory information is available
- ③ All inventory is based on best available information
- ④ Inventory numbers for Source ID 9, 11 and 15 are regional inventories distributed across watersheds by percentage of land area

Table A-6. Priority Sources of Pollutants

Sources of Pollutants	Source Priority	Pollutants
Discharger's Facilities (a)	M	Metals, Bacteria, Sediment, Nutrients, Pesticides
Roads, Streets, Highways, Parking Facilities, and Vehicular Storage Areas	H	Metals, Bacteria, Sediment
Marinas and Boat Repair, Fueling, and Maintenance	H	Metals, Bacteria
Industrial Facilities (b)	H	Metals
Commercial Auto-Related Facilities (c)	H	Metals, Sediment
Home Auto Care Activities	H	Metals
Residential Activities		Bacteria, Over Irrigation
Dog Waste, Trash, and Landscaping Waste Management		Sediment
Landscaping and Construction Activities		Pesticides
Pesticide Management	M	Bacteria
Eating and Drinking Establishments	M	Bacteria, Nutrients, Sediment, Pesticides
Animal Related Facilities	M	Bacteria, Nutrients, Sediment, Pesticides, Over Irrigation
Golf Courses, Parks and Recreational Facilities	M	Bacteria, Nutrients, Sediment, Pesticides, Over Irrigation
Commercial Landscaping	L	Bacteria, Nutrients, Sediment, Pesticides, Over Irrigation
Commercial Pest Control - Pesticide Management	L	Pesticides
Construction - Contractors for Home and Commercial Improvements	H	Sediment

a) Sites for disposing and treating sewage sludge; landfills; water and wastewater treatment facilities; "corporate" maintenance and storage yards; MS4s

b) Motor freight; fabricated metal; primary metal; chemical and allied products

c) Auto mechanical repair, maintenance, fueling or cleaning; equipment mechanical repair, maintenance, fueling and cleaning; automobile and other vehicle body repair and painting; mobile automobile or vehicle washing; and retail and wholesale fueling

H - Highest Priority

M - Medium Priority, or Next Highest Priority

L - Lower Priority



Table A-7. Priority Sources Applicable to Each Discharger

Priority Sources	Caltrans	City of San Diego	City of La Mesa	City of Lemon Grove	County	Navy	Port
Discharger's Facilities	•	•	•	•	•	•	
Roads, Streets, Highways, Parking Facilities, and Vehicular Storage Areas	•	•	•	•	•	•	•
Marinas and Boat Repair, Fueling, and Maintenance		•				•	
Industrial Facilities		•	•	•			•
Commercial Auto-Related Facilities		•	•	•			
Home Auto Care Activities		•	•	•	•		
Dog Waste, Trash, and Landscaping Waste Management		•	•	•			
Landscaping and Construction Activities	•	•	•	•	•		
Pesticide Management	•	•	•	•	•		
Eating and Drinking Establishments		•	•	•			
Animal Related Facilities		•	•	•			
Golf Courses, Parks and Recreational Facilities		•	•	•		•	
Commercial Landscaping		•	•	•	•	•	•
Commercial Pest Control - Pesticide Management		•	•	•	•	•	•
Construction - Contractors for Home and Commercial Improvements		•	•	•	•	•	



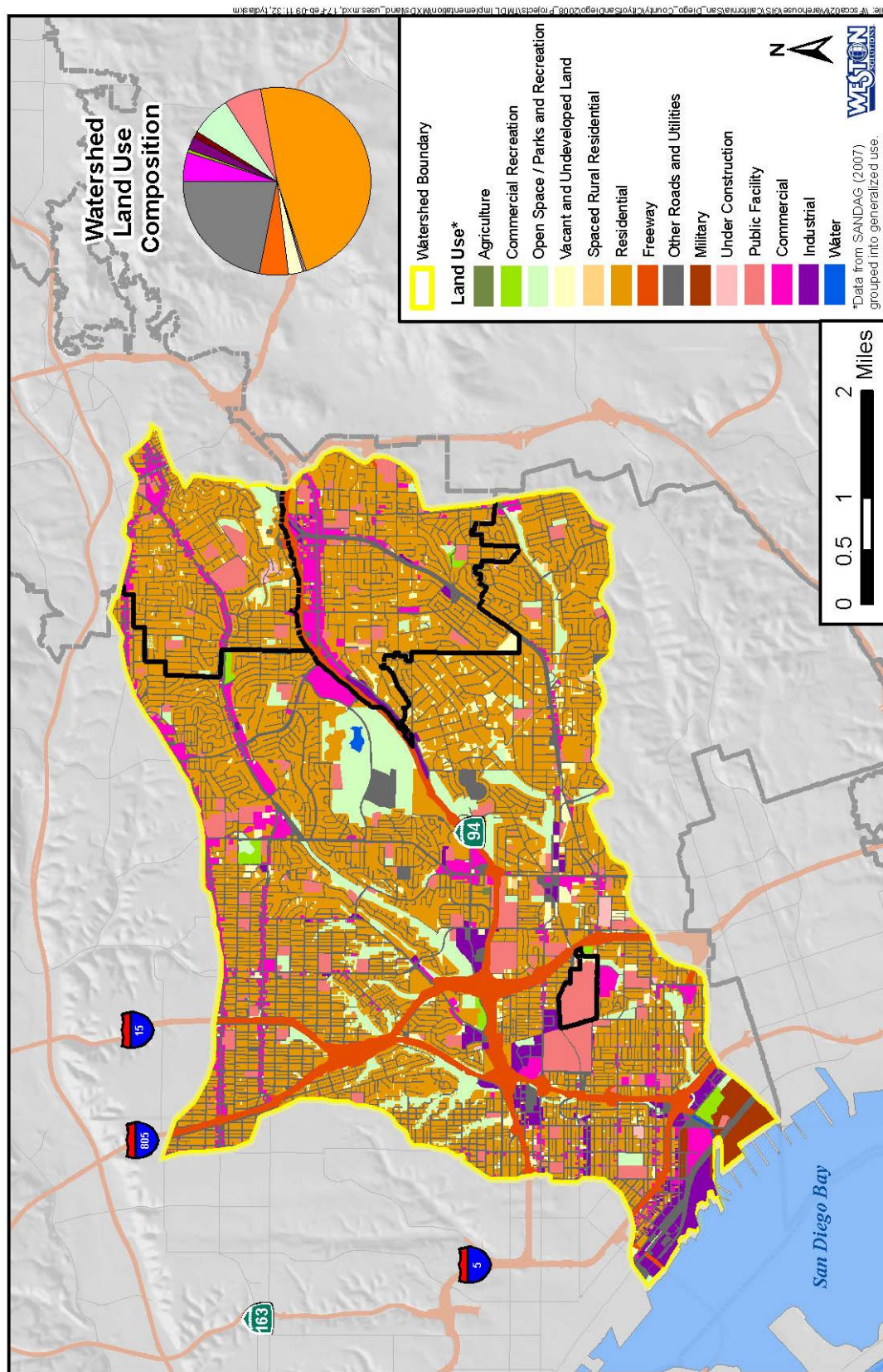


Figure A-2 Map of Land Uses in Chollas Creek Watershed

Tool A: Existing Conditions
Chollas Creek Metals TMDL Implementation Plan

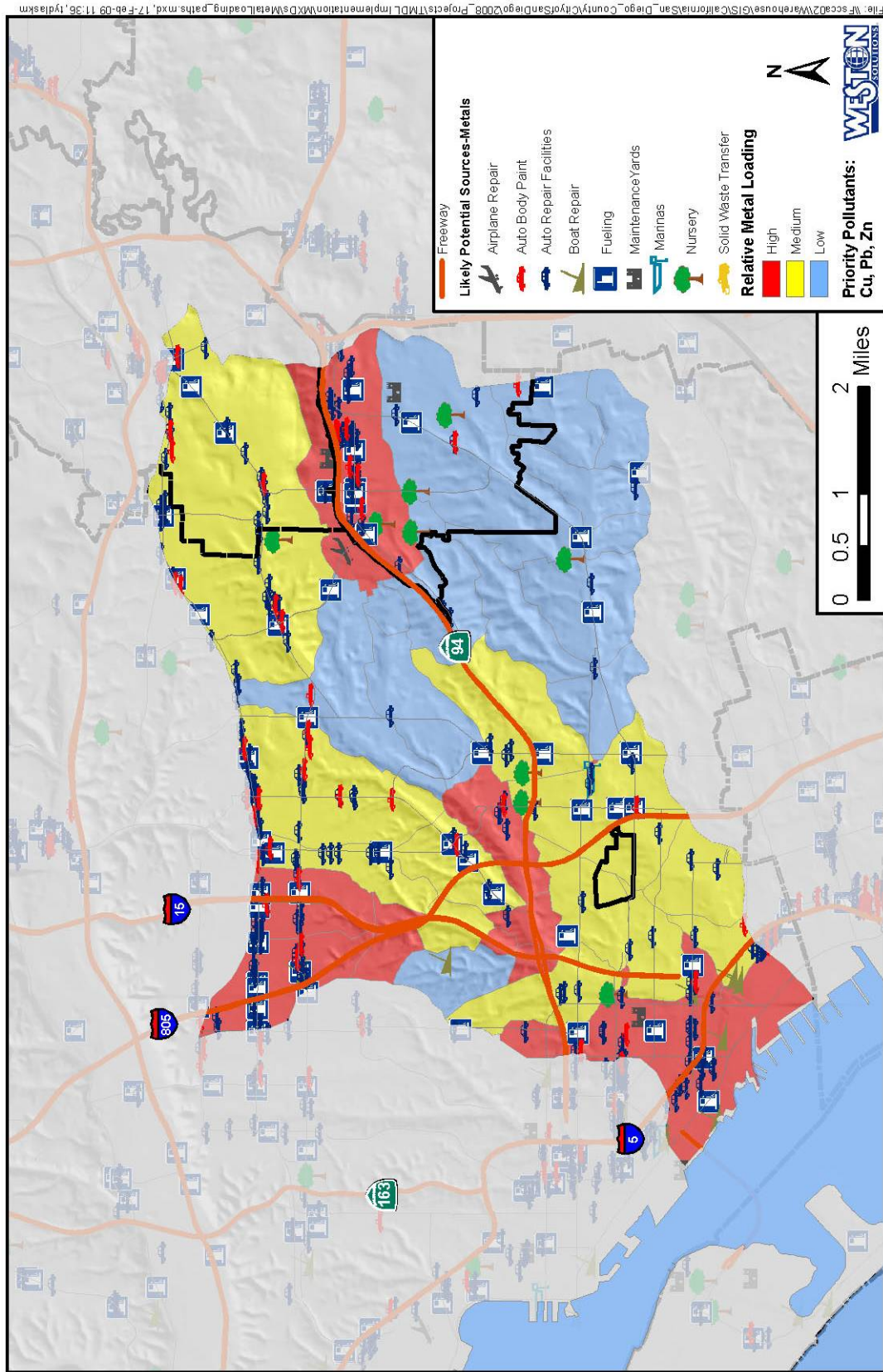


Figure A-3 Map of Metals Loading by Land Use in Chollas Creek Watershed

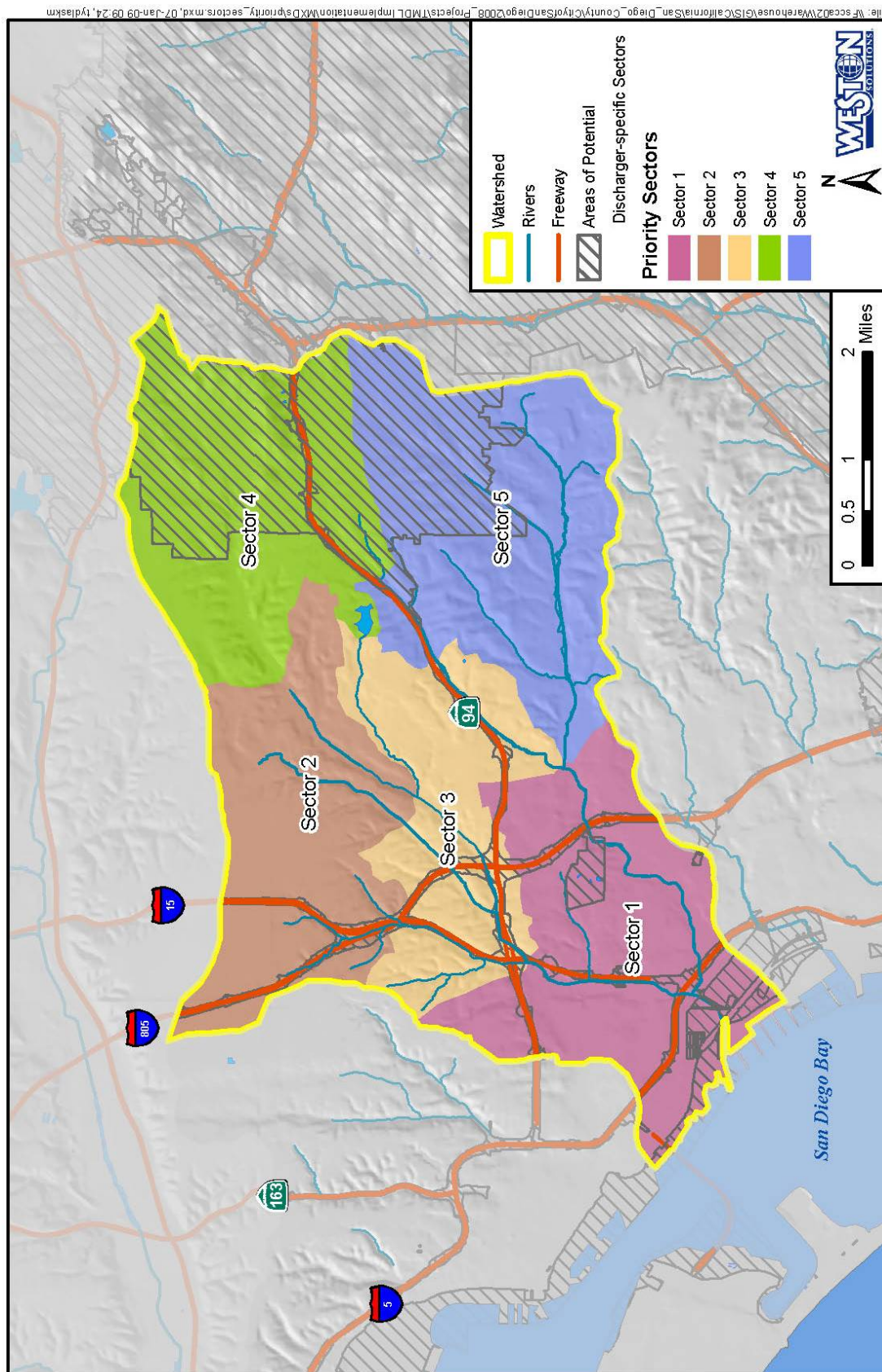


Figure A-4 Chollas Creek Watershed Priority Sector Map

Tool B

Strategic Planning Tool
Chollas Creek Metals TMDL
Implementation Plan

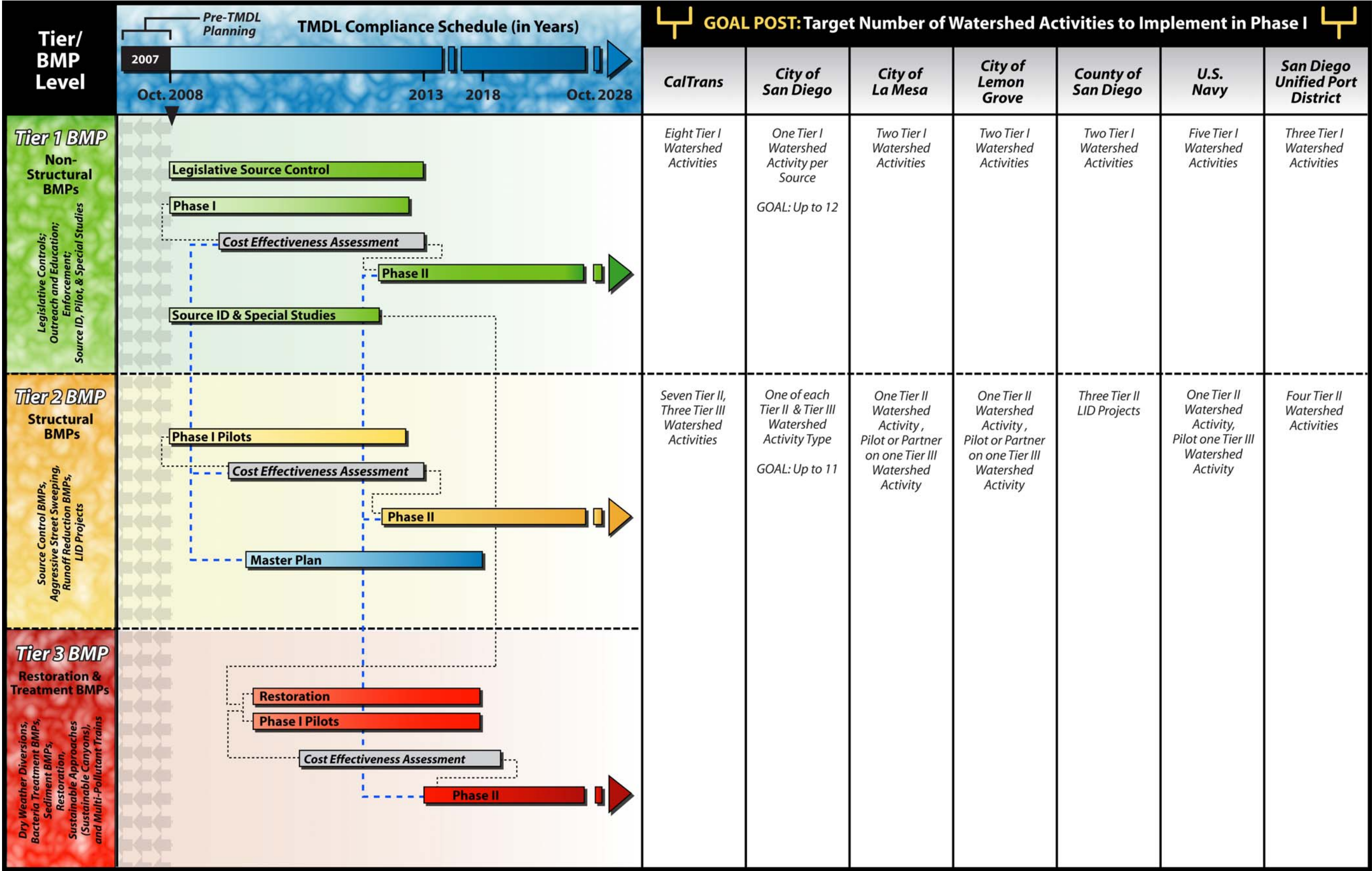


Figure B-1. Phases and Tiers of the Integrated TMDL Watershed Approach and Activity Implementation Goals

Tool C

General List(s) of Applicable Activities

Chollas Creek Metals TMDL

Implementation Plan



Table C-1. General List of Potential, Applicable Activities for Tier I– Non-Structural BMPs

Type of Activity	Activity Name	Description	Projects Applicable to Dischargers								
			Caltrans		City of San Diego	City of La Mesa	City of Lemon Grove	County		Navy	Port
Regulatory/ Legislative	Basin Plan Beneficial Use Designation Correction	Identify and delete obsolete/inaccurate Beneficial Use designations in Basin Plan to allow for concentration of efforts on achievable BU designation restoration and protection.	•		•	•	•	•	•	•	•
	Enhanced Development Standards	Review SUSMP and Discharger design standards for new developments, redevelopments, roadway improvements, and parking lots for opportunities to incorporate LID standards, where applicable.	•		•	•	•	•	•	•	•
	Code Modification	Review and update ordinances to promote water quality–friendly products, behaviors, LID techniques, and water reuse (grey water, purple pipe, etc). Code Modification may be a stand alone Activity, or a component of another watershed activity.			•	•	•	•			•
	Product Substitution	Identify products use that contributes to pollutant loading and water quality degradation and identify substitutes that are less harmful to water quality. Coordinate with appropriate Stakeholders to plan and implement education/outreach to achieve voluntary movement towards use of substitute products, voluntary manufacture of substitute products (partnering with industry stakeholders), legislation changes, and/or other product substitution strategies. Example product substitution activities include: evaluating alternative types of fencing, lobbying for non-copper material to be used in break pads, prohibiting (and/or restricting) use of outdoor architectural copper, etc.	•		•	•	•	•	•	•	•
Outreach/ Education	Watershed Advertisement	Purchase ad space/time (e.g., billboards, transit shelters, radio, television, and print) to broadcast messages promoting specific water quality–friendly behaviors.	•		•	•	•	•			
	Targeted Outreach Materials	Develop and strategically distribute pollutant-, source-, activity-, and audience-specific outreach materials (some guidance available in <i>Basic BMPs</i> matrix in Tool D, Table D-2).	•		•	•	•	•			•
	Targeted Behavioral Training	Develop pollutant-, source-, and activity-specific training materials (some guidance available in <i>Basic BMPs</i> matrix in Tool D, Table D-2). Conduct training sessions where information is taught and distributed; training may include simulations, facilities tours, and other means to demonstrate water-quality-friendly behaviors.	•		•	•	•	•	•	•	•
	LID Education	Conduct LID education and training for jurisdictional authorities responsible for development and planning. Goal would be to identify opportunities to incorporate LID techniques into maintenance and capital improvement projects and then obtain authority to incorporate LID.	•		•	•	•	•	•	•	•
	LID Construction Outreach	Inform public of water-quality-related capital improvement projects to be constructed within jurisdiction. Combine Construction Outreach with Watershed Advertisement, Training and other efforts to promote specific water-quality-friendly behaviors.	•		•	•	•	•			
	LID Contractor Outreach	Conduct LID outreach, education, and training to construction contractors. Participation in LID Contractor Outreach could be incorporated into the construction Bid process and combined with other Targeted efforts for outreach and education. As the program advances, jurisdictions may make experience in LID a criterion in the jurisdictional contractor approval process.			•	•	•	•			
	Community-Based Social Marketing Pilots	Select specific business and residential behaviors that are detrimental to water quality, and identify factors sustaining those behaviors (see <i>Basic BMPs</i> in Tool D, Table D-2). Develop pilot education and outreach programs that specifically address those factors to determine which programs are most effective in eliciting behavioral changes for broader implementation.			•	•	•		•	•	



Table C-1. General List of Potential, Applicable Activities for Tier I– Non-Structural BMPs

Type of Activity	Activity Name	Description	Projects Applicable to Dischargers								
			Caltrans		City of San Diego	City of La Mesa	City of Lemon Grove	County		Navy	Port
Enforcement	Targeted Facility Inspections (with education/outreach)	Identify likely pollutant source facilities based on geospatial analyses of facility locations and monitoring data to focus facility inspections. Tailor education/outreach efforts for problem facilities and distribute. Recommend or mandate implementation of <i>Basic BMPs</i> listed in Tool D, Table D-2.	•		•	•	•				•
	Targeted Enforcement	Focus enforcement efforts by some criteria (e.g., land use, facility type, activity, geography, and audience) to address identified high-priority water problems. Review facilities for <i>Basic BMPs</i> listed in Tool D, Table D-2.	•		•	•	•	•		•	
	Inspection-Generated Enforcement	Identify likely pollutant source facilities based on geospatial analyses of facility locations and monitoring data to focus storm water-associated inspections and enforcement on problem facilities. Review facilities for <i>Basic BMPs</i> listed in Tool D, Table D-2.	•		•	•	•	•			
	Enforcement Referrals	Identify problem facilities and activities exempt from Dischargers’ code enforcement/prosecution (i.e., upstream of jurisdictional area or exempt from code). Refer to appropriate agency or jurisdiction for corrective action.	•		•	•	•				
Special Pilot Studies	Targeted Mobile Household Waste Collection Centers Pilot	Conduct a two-year cost-benefit analysis of implementing targeted, mobile household waste collection centers.			•		•				
	Targeted Storm Drain Maintenance Pilot	Determine optimum frequency and scheduling of storm drain cleaning.	•		•	•	•	•		•	
	Doggie Bag Dispenser Installation Pilot	Identify areas with pet waste problems, and install dispensers / promote pet waste collection to reduce bacterial loading.			•	•	•	•			
Special Studies	Pollutant Source ID and other Special Studies	Conduct Permit required and other source identification studies of priority pollutants at priority sources to determine actually loadings. Implement iterative evaluation process and planning strategy.	•		•	•	•	•		•	•
	Pollutograph Studies	Collect and analyze storm water samples to develop and analyze pollutographs to implement iterative evaluation process and planning strategy. Also evaluate design storm criteria and other design factors that impact concentration-based pollutant loads.	•		•	•	•	•		•	•
	Master Plan	Review existing soil, sediment, and infrastructure conditions, Capital Improvements schedule and TMDL implementation plan/schedule (Appendix B). Integrate into a Master Plan for jurisdiction. This effort may be incorporated into Tier I LID Education and Code Modification activities.	•		•		•	•		•	•



Table C-2. General List of Potential, Applicable Activities for Tier II – Structural BMPs

Type of Activity	Activity Name	Description	Projects Applicable to Dischargers						
			Caltrans	City of San Diego	City of La Mesa	City of Lemon Grove	County of San Diego	Navy	Port
Targeted Source Control BMPs	Shoreline Kelp Removal	Identify shorelines where tractor rakes/sweepers have difficulty accessing. Implement alternative kelp removal techniques to reduce bacteria host sites and bacterial loading.		•				•	
	Trash/Debris Cleanup	Sponsor local organizations’ cleanup efforts to remove litter from public areas and waterways from the Chollas Creek Watershed.	•	•	•	•	•	•	•
	Homeless Encampment Removal	Sponsor local organizations’ efforts to identify and eradicate illegal human settlement camps along Chollas Creek to reduce bacterial, metals, and trash loading.	•	•		•	•		•
Targeted Aggressive Street Sweeping	Street Sweeping	Use specialized street sweepers and/or increase street-sweeping efforts in areas with high volumes of vehicular and human traffic/activity to reduce the accumulation of metals and trash before they are washed into the MS4 and local waterbodies.	•	•	•	•	•	•	
Runoff Reduction/ Incentive Program	Residential Landscaping Retrofit Pilot	Retrofit residential landscaping system using latest technology and using BMPs to reduce water consumption and runoff. Model water use before and after implementation to estimate future changes in water consumption and runoff when implementing similar retrofits.		•	•	•			
	Artificial Turf Pilot	Install artificial turf in pocket parks or other small landscaped areas. Characterize load contribution before and after implementation, and track water, fertilizer, and pesticide use. Dischargers are advised to tie these efforts into water conservation efforts.		•	•	•	•		
	Smart Irrigation Control Incentive Program – Residential Program	Disseminate information and promote installation of devices in targeted residential areas through rebates or giveaways.		•	•	•			
	Smart Irrigation Control Incentive Program – Commercial Program	Disseminate information and promote installation of devices in targeted commercial and/or industrial areas through rebates or giveaways.		•	•	•	•		
	Downspout Redirection Incentive Program – Residential Program	Disseminate information and promote redirection of downspouts to landscaped areas for infiltration in targeted residential areas.		•	•	•			
	Downspout Redirection Incentive Program – Commercial Program	Disseminate information and promote redirection of downspouts to landscaped areas for infiltration in targeted commercial and/or industrial areas.		•	•	•	•		
	Rain Barrel Incentive Program – Municipal/Residential	Disseminate information and promote installation of rainwater collection containers that harvest rainwater for landscaping irrigation and other non-potable uses. Implementation of this program will begin on City-owned properties where signage and other outreach information will be made available to the local community. This phase will be followed by a pilot program in a targeted residential area and will include incentives like rebates or giveaways.		•		•			
	Stormwater Harvesting (Outdoor Use)	This type of watershed activity may include piloting, disseminating information about, and/or incentivizing storm water harvesting projects for outdoor use, such as green grid roofs, rain gardens, etc.		•		•	•		
	Stormwater Harvesting (Indoor Use)	This type of watershed activity may include piloting, disseminating information about, and/or incentivizing non-potable indoor use of harvested storm water. Indoor uses could include sewage conveyance, indoor landscaping, etc.		•		•	•		

Table C-2. General List of Potential, Applicable Activities for Tier II – Structural BMPs

Type of Activity	Activity Name	Description	Projects Applicable to Dischargers						
			Caltrans	City of San Diego	City of La Mesa	City of Lemon Grove	County of San Diego	Navy	Port
Inlet Trash/Debris Segregation BMP	Inlet Trash/Debris Segregation BMP	In conjunction with targeted street sweeping, install inlet devices to capture trash/debris prior to conveyance into local waterbodies. Due to long-term high maintenance issues, this BMP will first be piloted with aggressive street sweeping to assess the maintenance requirements compared to their trash removal effectiveness. The use of a multi-catchment /drainage area approach to trash removal (e.g., hydrodynamic separator at the MS4 outfall) may need to be used as part of a treatment train Tier III approach.	•	•	•	•	•	•	
Low Impact Development Pollution Control BMPs	Green Street – Infiltration	Replace sidewalks and asphalt paving with porous concrete sidewalks and porous asphalt paving. Install bioretention areas along residential right of ways in high pollutant loading areas. These BMPs will infiltrate design storm or first-flush urban runoff, thereby reducing runoff volume and pollutant loading.		•		•			
	Green Street – Filtration	This Green Street option is used where geotechnical conditions do not favor infiltration and where underground utilities allow. Porous concrete and asphalt is used to replace impervious sidewalks and streets. Runoff is filtered through an amended soil layer below the aggregate subbase of the porous pavement. Underdrains in/below the amended soil layer direct water to the MS4. Bioretention planters also capture urban runoff. A deeper amended soil layer in these areas allows larger plants to grow, and the plants treat/remove storm water through evapotranspiration. For projects where reclaimed water is not available for irrigation or maintenance issues have been identified, these bioretention areas can alternatively use amended soil with a decorative river rock/cobble surface. Depending on site conditions, addition gravel storage layers and underdrains to the MS4 may be needed.		•		•			
	Green Mall – Infiltration	Replace sidewalks and asphalt paving with porous concrete sidewalks and porous asphalt paving. Install planter boxes along commercial/industrial right-of-ways in high pollutant loading areas. These BMPs will infiltrate design storm or first-flush urban runoff, thereby reducing runoff volume and pollutant loading.		•		•	•		
	Green Mall – Filtration	This Green Mall option is used where geotechnical conditions do not favor infiltration and where underground utilities allow. Pollutants are removed by filtering runoff through amended soil layers below a section of porous pavement or capturing runoff in bioretention areas (see filtration-type Green Street description). Additional runoff and pollutant load reduction techniques include collecting roof runoff into planter boxes and cisterns/rain barrels to reuse storm water and Green Roof technology.		•		•	•		
	Green Lot – Infiltration	Replace sidewalks and asphalt paving with porous concrete sidewalks and porous asphalt paving. Install planter boxes in high pollutant loading areas. These BMPs will infiltrate design storm or first-flush urban runoff, thereby reducing runoff volume and pollutant loading.		•		•	•	•	
	Green Lot – Filtration	This Green Lot option is used where geotechnical conditions do not favor infiltration and where underground utilities allow. The filtration Green Lot is similar in design to the filtration Green Street concept, but applied to large parking lot areas.		•		•	•	•	
	Infiltration Vault/Pit Installation	Install underground vaults/pits with associated headworks to capture and store urban runoff and allow it to infiltrate the ground.	•	•		•	•	•	
	Integrated Water Reuse Project	Implement projects that integrate the reuse of storm water to meet increasing water supply needs of region into a Tier II LID project, a Tier III sustainable canyons project, etc.		•		•	•		



Table C-3. General List of Potential, Applicable Activities for Tier III – Restoration and Treatment BMPs

Type of Activity	Activity Name	Description	Projects Applicable to Dischargers						
			Caltrans	City of San Diego	City of La Mesa	City of Lemon Grove	County of San Diego	Navy	Port
Targeted Dry Weather Diversions	Dry Weather Diversion	Install inlet system diversion structure to direct dry weather runoff into sewage system for treatment instead of directly discharging flows into receiving waterbodies.		•		•	•	•	
Bacteria Treatment BMPs	Bacteria Treatment BMP	Install Bacteria Treatment BMPs during pilot study. These structural BMPs are currently designed for low flow conditions and therefore must be used as part of an integrated approach with upstream Tier I and Tier II BMPs. The effectiveness of this BMP on larger storm flows is not proven and would require pilot testing during Phase I.		•	•	•	•	•	
Erosion and Sediment Controls and Hydromodification BMPs	Hydro-Modification Management BMP	Determine priority areas for erosion and sediment control by estimating the sediment loading for a developed site as if were undeveloped open-space. Compare this loading to the existing load reduction requirements and requirements to reduce hydro-modification of downstream channels.	•	•		•	•	•	
	Erosion/Sediment Control BMP	Identify specific sites with erosion/sediment problems. Engineer and construct site-specific structural solutions that reduce runoff flow velocity and promote suspended solid settling.	•	•	•	•	•		
	Detention Basin Operation and Maintenance (O&M) Sponsorship/Endowment	Coordinate with non-profit stakeholders to establish endowments to sponsor and fund the operation and maintenance of sediment control detention basins.	•	•		•	•	•	•
Restoration	Creek/Habitat Restoration	Restore creeks and associated habitat to improve natural filtration capabilities. This project type includes removing existing concrete channels and re-establishing native substrate and vegetation.	•	•		•	•	•	•
Sustainable Treatment Approaches	Sustainable Canyons Program	Identify and develop a master plan for canyon-associated improvements, including storm water load reductions/ compliance, habitat restoration and enhancement, and infrastructure improvements.		•		•	•		
	Sustainable Canyons – Upgrade to MS4 Outfall	Upgrade existing outfalls that discharge into the canyons to address issues like erosion, deferred maintenance, and poor water quality. Upgrades include extending the outfall to the base of the slope, improving outfall stabilization, controlling peak flow and peak velocity, and implementing BMPs that remove gross solids and sediments (e.g., hydrodynamic separators or vaults with baffles).		•		•	•		
	Sustainable Canyons – Treatment Train/Extension of MS4	In addition to an existing MS4 outfall upgrade project, a treatment train is attached to the MS4 to provide additional treatment for dissolved metals and bacteria. Treatment trains have a low through-put capacity; therefore, this type of project must be integrated with an upstream Tier I and Tier II BMP program that reduces runoff volume and pollutant loading.		•		•			
	Sustainable Canyons – Offline Natural Treatment System (NTS)/ Restoration	In addition to an existing MS4 outfall upgrade project, a NTS is installed offline from the main canyon channel. The NTS is designed to provide additional treatment for dissolved metals and bacteria for first flush and design storm flows; larger flows are diverted. A NTS has a low through-put capacity; therefore, this type of project must be integrated with upstream Tier I and Tier II BMPs that reduce runoff volume and pollutant loading.		•		•			
	Sustainable Canyons – Inline NTS/ Restoration	In addition to an existing MS4 outfall upgrade project, a NTS is installed to treat a design storm flow in the canyon channel above a defined level. The NTS functions as a natural floodway that holds and reduces peak flows, retains sediment, and controls downstream erosion. NTS projects should be coordinated with slope stabilization and channel restoration projects.		•		•			



Table C-3. General List of Potential, Applicable Activities for Tier III – Restoration and Treatment BMPs

Type of Activity	Activity Name	Description	Projects Applicable to Dischargers						
			Caltrans	City of San Diego	City of La Mesa	City of Lemon Grove	County of San Diego	Navy	Port
	Sustainable Canyons – Channel Stabilization/Grade Controls/Restoration	Reduce flow velocities and downstream erosion in the canyon using grade controls and stabilization techniques (e.g., toe of slope reinforcement structures and/or channel bank bioengineering). These projects should be coordinated with inline NTS projects.		•		•	•		
	Sustainable Canyons – Trail and Utility Access Enhancement	Reduce sedimentation and improve public access/education by enhancing existing and planned access roads and trails. Projects include using sustainable materials, installing erosion controls and culvert channel crossings, and stabilizing inlets and outlets of existing culvert crossings. Install security features to address illegal dumping and unauthorized vehicle and off road vehicle access.		•		•			
Integrated Multi-Treatment Train System *	Limited Low-Flow Storm Drain Inlet Multi-Pollutant Treatment System	Install inlet devices to remove gross solids and filter other pollutants (e.g., oil and bacteria) from low-flow runoff before discharge into the MS4. These systems have a low treatment capacity (typically less than 0.3 cfs flow), so systems should be implemented in conjunction with runoff reduction Green Street, Green Mall, and Green Lot BMPs.	•	•	•	•	•	•	
	Small-Scale Storm Flow Storage and Multi-Pollutant Treatment System	Install devices to capture and temporarily store storm flows, to settle pollutants, and to treat/filter water before discharge to the MS4.	•	•	•	•	•	•	
	Large-Scale Storm Flow Storm and Multi-Pollutant Treatment System	Construct a comprehensive, large-scale system to capture and temporarily store large amounts of storm flows, to settle pollutants, and to treat/filter water before discharge to the MS4.	•	•		•	•	•	

* Multi-Treatment Train projects should only be implemented after implementation of sustainable treatment approaches and restoration activities.

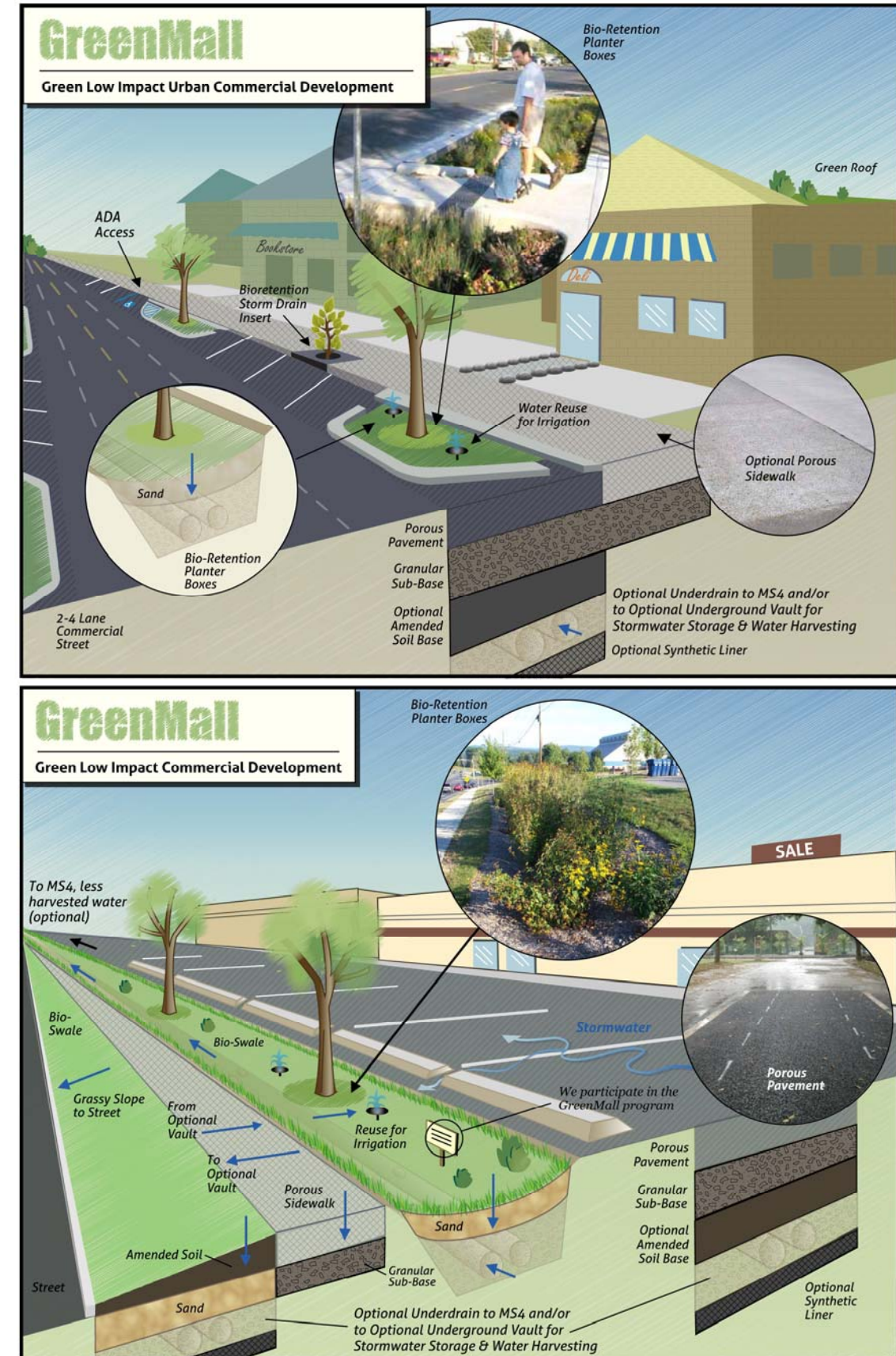
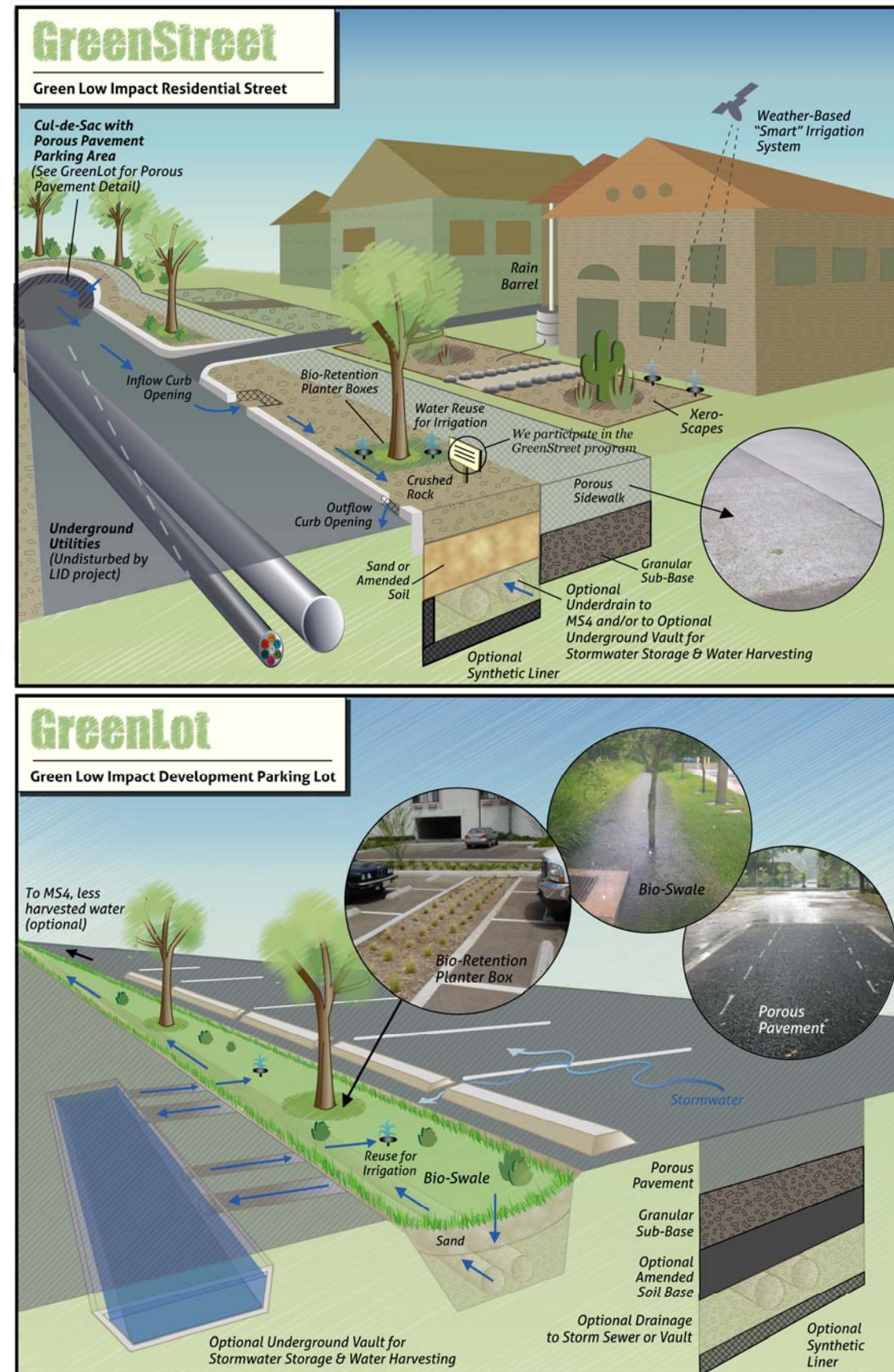


Figure C-1. Tier II Low Impact Development Pollution Control BMPs

Tool D

Prioritization Tool

*Chollas Creek Metals TMDL
Implementation Plan*

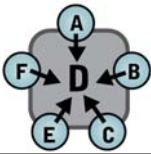


Table D-1. Priority Sources and Types of Activities

Type of Activity <i>See General List(s) of Potentially Applicable Watershed Activities (Tool C)</i>	Name of Watershed Activity	Priority Sources of PWQP												
		HIGHEST PRIORITY SOURCES						MEDIUM PRIORITY SOURCES				LOWER PRIORITY SOURCES		
		Roads, Streets, Parking Lots	Marinas and Boat Repair	Commercial Auto-Related Facilities	Industrial Facilities	Construction	Residential Areas and Activities	Discharger's Facilities	Eating and Drinking Establishments	Animal Facilities	Golf Courses, Parks and Recreation Facilities	Commercial Landscaping	Pest Control Services	Other (additional activities identified as applicable)
Regulatory/Legislative	Basin Plan Beneficial Use Designation Correction	•	•	•	•	•	•	•	•	•	•	•	•	•
	Enhanced Development Standards	•				•	•	•			•	•		•
	Code Modification	•	•	•	•	•	•	•	•	•	•	•	•	•
	Product Substitution	•	•	•	•	•	•	•	•	•	•	•	•	•
Outreach/Education	Watershed Advertisement	•	•	•	•	•	•					•	•	•
	Targeted Outreach Materials	•	•	•	•	•	•	•	•	•	•	•	•	•
	Targeted Behavioral Training (to Staff)		•	•	•	•		•	•	•	•	•	•	•
	LID Construction Outreach					•	•				•			•
	Community-Based Social Marketing Pilots		•	•	•		•		•	•	•		•	•
Enforcement	Targeted Facility Inspections (with education/outreach)	•	•	•	•	•	•	•	•	•	•	•	•	•
	Targeted Enforcement	•	•	•	•	•	•	•	•	•	•	•	•	•
	Inspection-Generated Enforcement	•	•	•	•	•	•	•	•	•	•	•	•	•
	Enforcement Referrals	•	•	•	•	•	•	•	•	•	•	•	•	•
Special Pilot Studies	Targeted Mobile Hazardous Waste Household Collection Centers Pilot						•							•
	Targeted Storm Drain Maintenance Pilot	•	•	•	•	•	•	•	•	•	•			•
	Doggie Bag Dispenser Installation Pilot	•					•			•	•			•

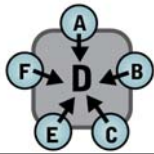


Table D-1. Priority Sources and Types of Activities

Type of Activity	Name of Watershed Activity	Priority Sources of PWQP												
		HIGHEST PRIORITY SOURCES						MEDIUM PRIORITY SOURCES				LOWER PRIORITY SOURCES		
		Roads, Streets, Parking Lots	Marinas and Boat Repair	Commercial Auto-Related Facilities	Industrial Facilities	Construction	Residential Areas and Activities	Discharger's Facilities	Eating and Drinking Establishments	Animal Facilities	Golf Courses, Parks and Recreation Facilities	Commercial Landscaping	Pest Control Services	Other (additional activities identified as applicable)
Special Studies	Pollutant Source ID and other Special Studies	•	•	•	•	•	•	•	•	•	•	•	•	•
	Pollutograph Studies	•	•	•	•	•	•	•	•	•	•	•	•	•
	Master Plan	•	•	•	•	•	•	•	•	•	•	•	•	•

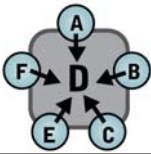


Table D-1. Priority Sources and Types of Activities

Type of Activity <i>See General List(s) of Potentially Applicable Watershed Activities (Tool C)</i>	Name of Watershed Activity	Priority Sources of PWQP												
		HIGHEST PRIORITY SOURCES						MEDIUM PRIORITY SOURCES				LOWER PRIORITY SOURCES		
		Roads, Streets, Parking Lots	Marinas and Boat Repair	Commercial Auto-Related Facilities	Industrial Facilities	Construction	Residential Areas and Activities	Discharger's Facilities	Eating and Drinking Establishments	Animal Facilities	Golf Courses, Parks and Recreation Facilities	Commercial Landscaping	Pest Control Services	Other (additional activities identified as applicable)
Targeted Source Control BMPs	Shoreline Kelp Removal		•					•						•
	Trash/Debris Cleanup	•					•				•	•		•
	Homeless Encampment Removal													•
Targeted Aggressive Street Sweeping	Aggressive Street Sweeping Pilot Program	•				•	•	•						•
Runoff Reduction/ Incentive Program	Residential Landscaping Retrofit Pilot	•				•	•				•	•	•	•
	Artificial Turf Pilot	•					•		•	•	•	•	•	•
	Smart Irrigation Control Incentive Program (Residential Program)					•	•				•	•	•	•
	Smart Irrigation Control Incentive Program (Commercial Program)				•	•		•	•	•	•	•	•	•
	Downspout Redirection Incentive Program (Residential Program)					•	•				•	•		•
	Downspout Redirection Incentive Program (Commercial Program)				•	•		•	•	•	•	•		•
	Rain Barrel Incentive Program (Municipal/Residential)				•	•	•	•	•	•	•	•	•	•
	Rainwater Harvesting (indoor and outdoor)				•	•	•	•	•	•	•	•	•	•
Inlet Trash/Debris Segregation BMP	Inlet Trash/Debris Segregation BMP	•	•		•	•	•	•	•		•		•	•
Low Impact Development Pollution Control BMPs	Green Street – Infiltration	Dischargers are advised to use the Source Map (Figure A-1), Land Use Map (Figure A-2), Metals Loading Map (Figure A-3), and Sector Map (Figure A-4) to help identify appropriate project locations.												
	Green Street – Filtration													
	Green Mall – Infiltration													
	Green Mall – Filtration													
	Green Lot – Infiltration													
	Green Lot – Filtration													
	Infiltration Vault/Pit Installation													

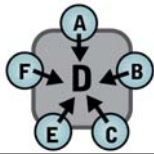






Table D-1. Priority Sources and Types of Activities

Type of Activity	Name of Watershed Activity	Priority Sources of PWQP												
		HIGHEST PRIORITY SOURCES						MEDIUM PRIORITY SOURCES				LOWER PRIORITY SOURCES		
		Roads, Streets, Parking Lots	Marinas and Boat Repair	Commercial Auto-Related Facilities	Industrial Facilities	Construction	Residential Areas and Activities	Discharger's Facilities	Eating and Drinking Establishments	Animal Facilities	Golf Courses, Parks and Recreation Facilities	Commercial Landscaping	Pest Control Services	Other (additional activities identified as applicable)
Targeted Dry Weather Diversions	Dry Weather Diversions	<div> Dischargers are advised to use the Source Map (Figure A-1), Land Use Map (Figure A-2), Metals Loading Map (Figure A-3), and Sector Map (Figure A-4) to help identify appropriate project locations. </div> <div>     </div>												
Bacteria Treatment BMPs	Bacteria Treatment BMPs													
	Limited Low-Flow Storm Drain Inlet Multi-Pollutant Treatment System													
	Small-Scale Storm Flow Storage and Multi-Pollutant Treatment System													
	Large-Scale Storm Flow Storm and Multi-Pollutant Treatment System													
Erosion and Sediment Controls/ Hydromodification BMPs	Hydro-Modification Management BMP													
	Erosion/Sediment Control BMP													
	Detention Basin Operation and Maintenance (O&M) Sponsorship/Endowment													
	Sustainable Canyons Program													
	Sustainable Canyons – Upgrade to MS4 Outfall													
	Sustainable Canyons – Treatment Train/Extension of MS4													
	Sustainable Canyons – Offline Natural Treatment System/Restoration													
	Sustainable Canyons – Inline Natural Treatment System/Restoration													
	Sustainable Canyons – Channel Stabilization/Grade Controls/Restoration													
	Sustainable Canyons – Trail and Utility Access Enhancement													
Restoration	Creek/Habitat Restoration													

Tier I Activities typically involve outreach and education, regulation, and enforcement (inspections) of sources of PWQP and urban runoff. The following Basic BMPs should be incorporated into the planning and implementation of Tier I Activities. Table D-2 is a matrix of pollutant sources and possible BMPs to contain or prevent pollution. Dischargers may choose to focus on specific sources of pollutants or on specific BMPs.

Table D-2. Basic BMPs to be Associated with Tier I Activities

Priority Sources in the Chollas Creek Watershed	# of Sources (BLTEA Inventory)	Cover		Containment										Prevention								Good Housekeeping					Administrative		
		Store/Conduct material/activity Inside	Cover Activity/material	Use designated areas for activity, clean up or loading	Berm activity area or direct run on	Provide secondary containment	Provide drip plans, etc. to collect leaks/spills	Clean floor mats, etc. indoors	Properly dispose of process or wash water.	Immediately clean up spills with dry methods	Keep animals out of creeks	Wash vehicles and equipment in designated areas	Maintain spill clean up material/equipment readily available	Properly store and dispose of green waste	Properly store and dispose hazardous material/chemicals	Schedule activity in dry weather	Label containers and maintain up-to-date inventory	Drain fluids from automobile	Provide signage for storm drains, materials storage, etc.	Properly manage pesticide/fertilizer use	Provide vegetation cover	Protect Storm drains	Practice water conservation	Inspect activity/storage area regularly	Clean up regularly with dry methods	Clean trash disposal areas	Train employees	Develop & Implement Spill Prevention Plan	Develop & Implement SWPPP
Commercial Auto-Related Facilities																													
Auto mechanical repair, maintenance, fueling, or cleaning	724		•	•	•				•	•		•	•		•		•	•	•					•	•		•		
Equipment mechanical repair, maintenance, fueling, or cleaning	57		•	•	•				•	•		•	•		•		•		•					•	•		•		
Automobile and other vehicle body repair and painting	112		•	•	•				•	•		•	•		•		•		•					•	•		•		
Mobile automobile or vehicle washing	-				•				•			•	•			•						•	•						
Retail or wholesale fueling	227		•		•				•	•			•						•					•	•		•		
Commercial Activities																													
Pest control services	40	•		•					•				•							•									
Mobile carpet, drape, or furniture cleaning	62								•				•														•		
General contractors for home/commercial improvements (e.g. cement mixing, masonry, painting, etc.)	-		•	•			•		•	•			•		•	•						•	•	•	•		•		
Botanical or zoological gardens and nurseries/greenhouses	18	•	•		•				•	•			•	•	•		•		•	•	•		•	•	•		•		
Landscaping – parks, golf courses, cemeteries, etc.	27		•		•								•	•	•	•	•		•	•	•		•		•		•		
Airplane mechanical repair, maintenance, fueling, or cleaning	9																												
Airfields	1																												
Animal facilities	42		•	•	•				•		•		•						•		•			•	•		•		
Marinas and Boat Repair																													
Marinas	26		•						•	•			•		•		•		•					•	•		•		

Table D-2. Basic BMPs to be Associated with Tier I Activities

Priority Sources in the Chollas Creek Watershed	# of Sources (BLTEA Inventory)	Cover		Containment										Prevention										Good Housekeeping					Administrative	
		Store/Conduct material/activity Inside	Cover Activity/material	Use designated areas for activity, clean up or loading	Berm activity area or direct run on	Provide secondary containment	Provide drip plans, etc. to collect leaks/spills	Clean floor mats, etc. indoors	Properly dispose of process or wash water.	Immediately clean up spills with dry methods	Keep animals out of creeks	Wash vehicles and equipment in designated areas	Maintain spill clean up material/equipment readily available	Properly store and dispose of green waste	Properly store and dispose hazardous material/chemicals	Schedule activity in dry weather	Label containers and maintain up-to-date inventory	Drain fluids from automobile	Provide signage for storm drains, materials storage, etc.	Properly manage pesticide/fertilizer use	Provide vegetation cover	Protect Storm drains	Practice water conservation	Inspect activity/storage area regularly	Clean up regularly with dry methods	Clean trash disposal areas	Train employees	Develop & Implement Spill Prevention Plan	Develop & Implement SWPPP	
Boat mechanical repair, maintenance, fueling, or cleaning	59		•	•	•				•	•		•	•		•	•			•					•	•		•	•		
Eating and Drinking Establishments	3574		•					•	•	•			•						•	•		•	•	•	•	•	•			
Residential Areas and Activities																														
Home automobile associated activities, home and garden care activities, waste disposal	-	•							•	•			•	•						•			•	•	•					
New development and significant redevelopment projects																														
Development subject to SUSMPs	82	•	•	•	•	•	•	•	•	•		•	•	•		•			•	•	•		•	•	•	•	•			
Construction sites	1674											•								•	•						•	•		
Discharger’s Facilities and Activities																														
Corporate yards (incl. maintenance/storage yards)	24	•	•	•	•	•	•		•	•		•	•	•		•			•	•			•	•	•	•	•	•	•	
Park and recreational facilities	-		•						•				•	•	•				•	•	•		•		•		•			
Active or closed municipal landfills	8																													
POTWs (water and wastewater)	29																													
Roadways, Streets and Parking Lots																														
Roads, streets, highways, and parking facilities	-			•			•		•	•			•			•			•			•	•	•			•	•		
Auto parking lots and storage facilities	-	•							•				•		•				•					•	•		•			
Industrial Facilities																														
Chemical and allied products	5	•	•	•	•	•			•	•			•			•			•					•	•		•	•	•	
Fabricated metal	51	•	•	•	•	•			•	•			•		•		•		•					•	•		•	•	•	
Primary metal	14		•		•	•			•	•			•			•			•					•	•		•	•	•	
Motor freight	61	•	•	•	•	•	•		•	•		•	•			•	•		•					•	•	•	•	•	•	

Tool E

Implementation Tool

Chollas Creek Metals TMDL

Implementation Plan

Table E-1. Steps and Goals for Implementing Tier I Activities

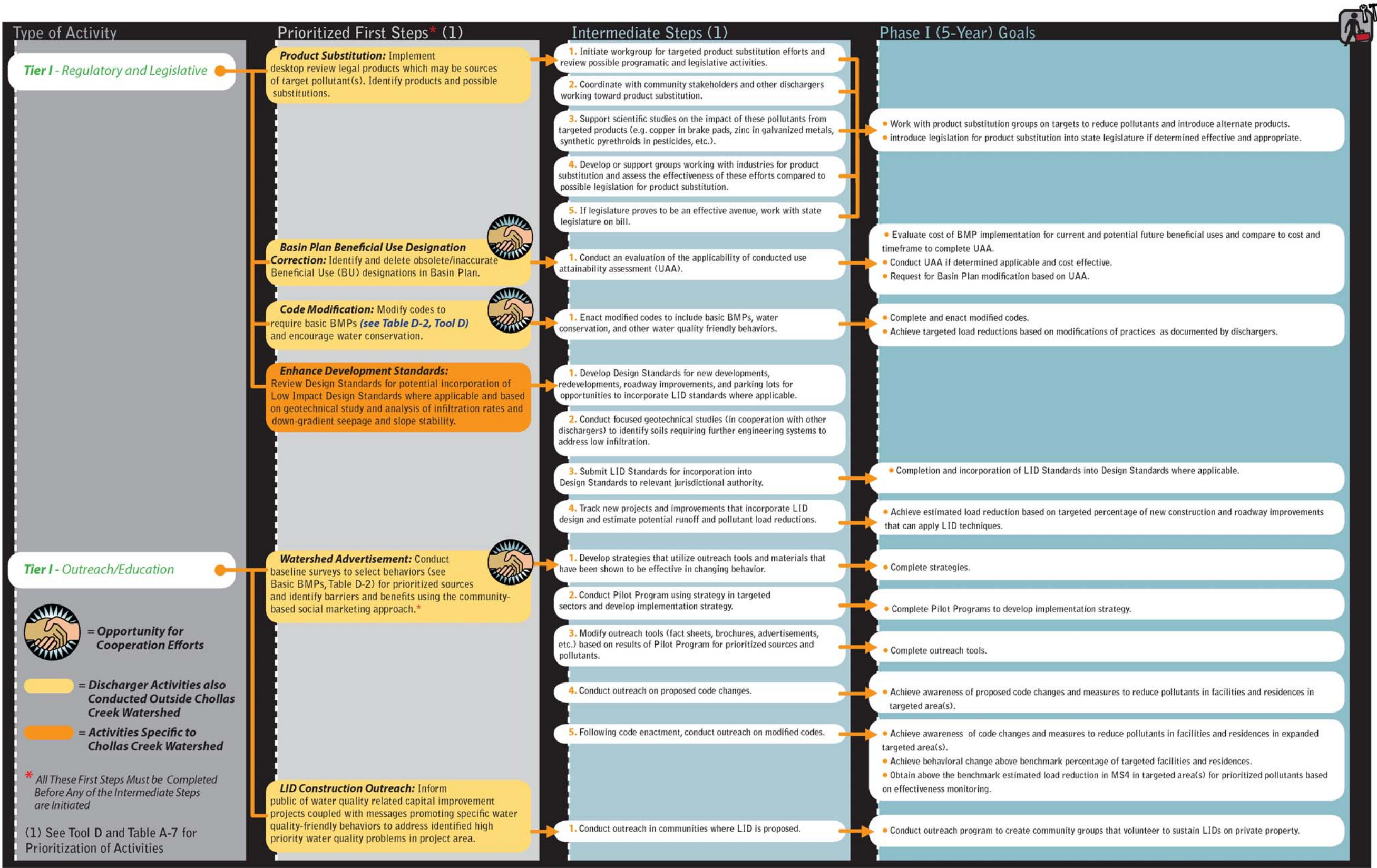


Table E-1. Steps and Goals for Implementing Tier I Activities



Table E-1. Steps and Goals for Implementing Tier I Activities



Table E-2. Steps and Goals for Implementing Tier II Activities

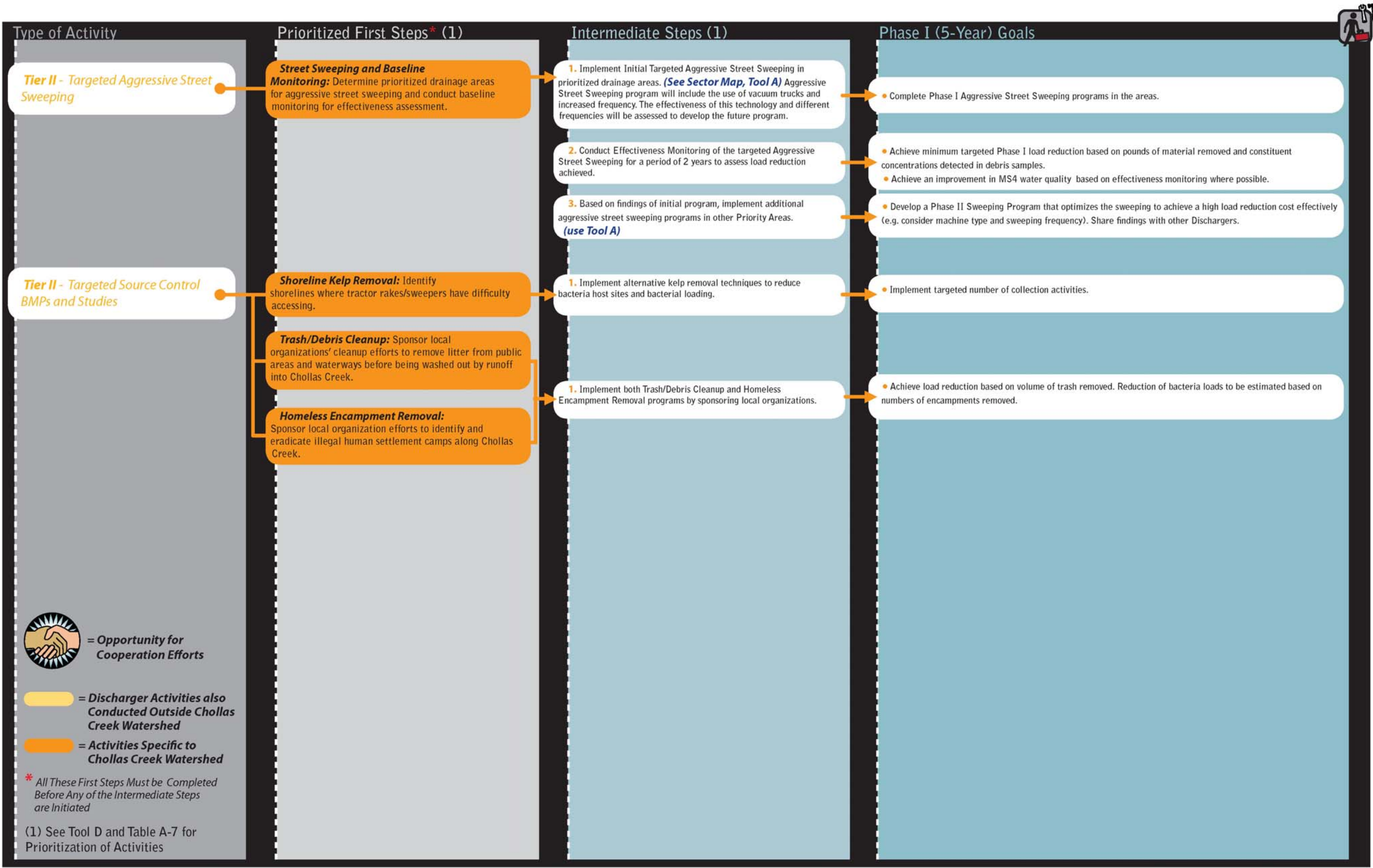


Table E-2. Steps and Goals for Implementing Tier II Activities

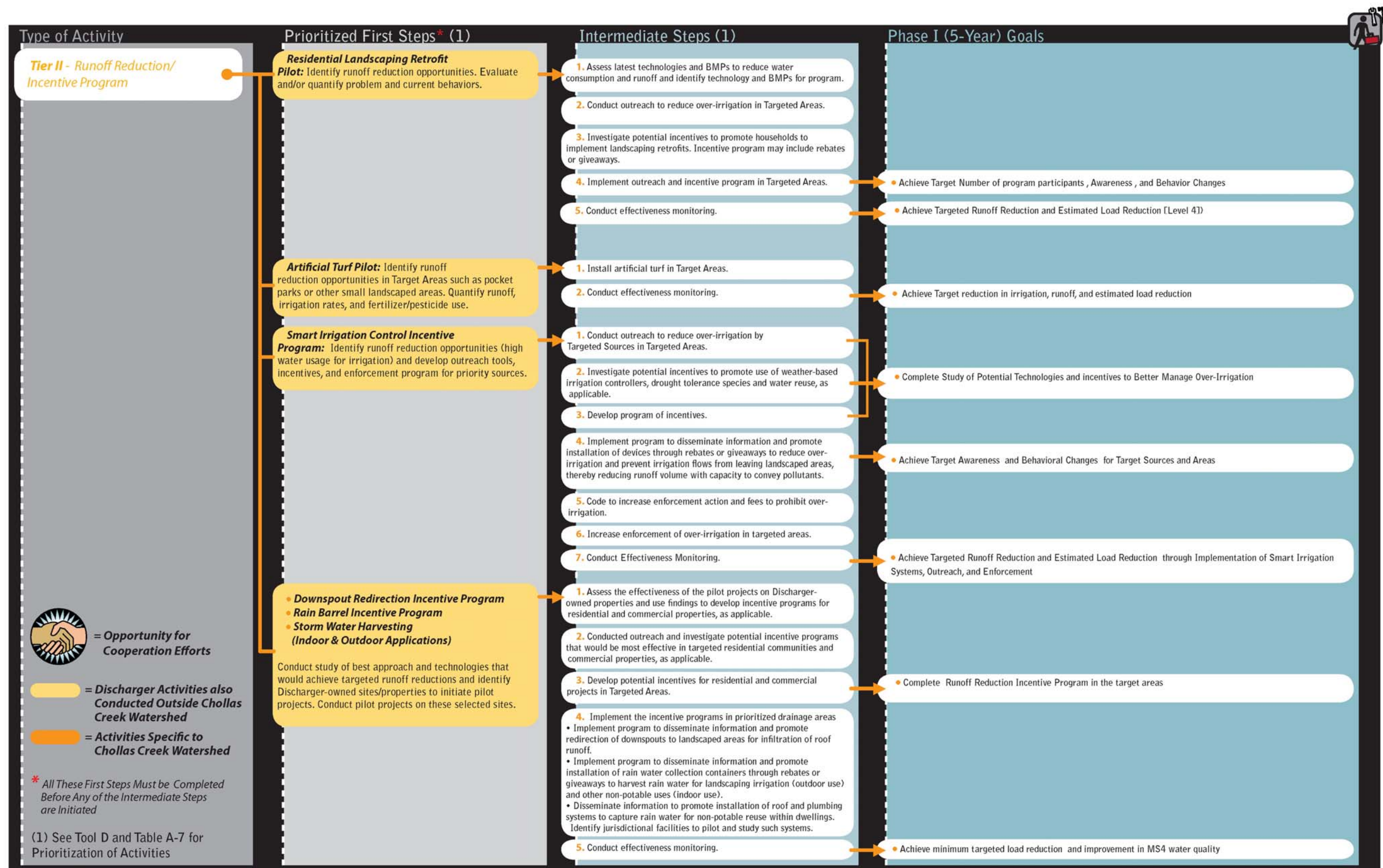


Table E-2. Steps and Goals for Implementing Tier II Activities

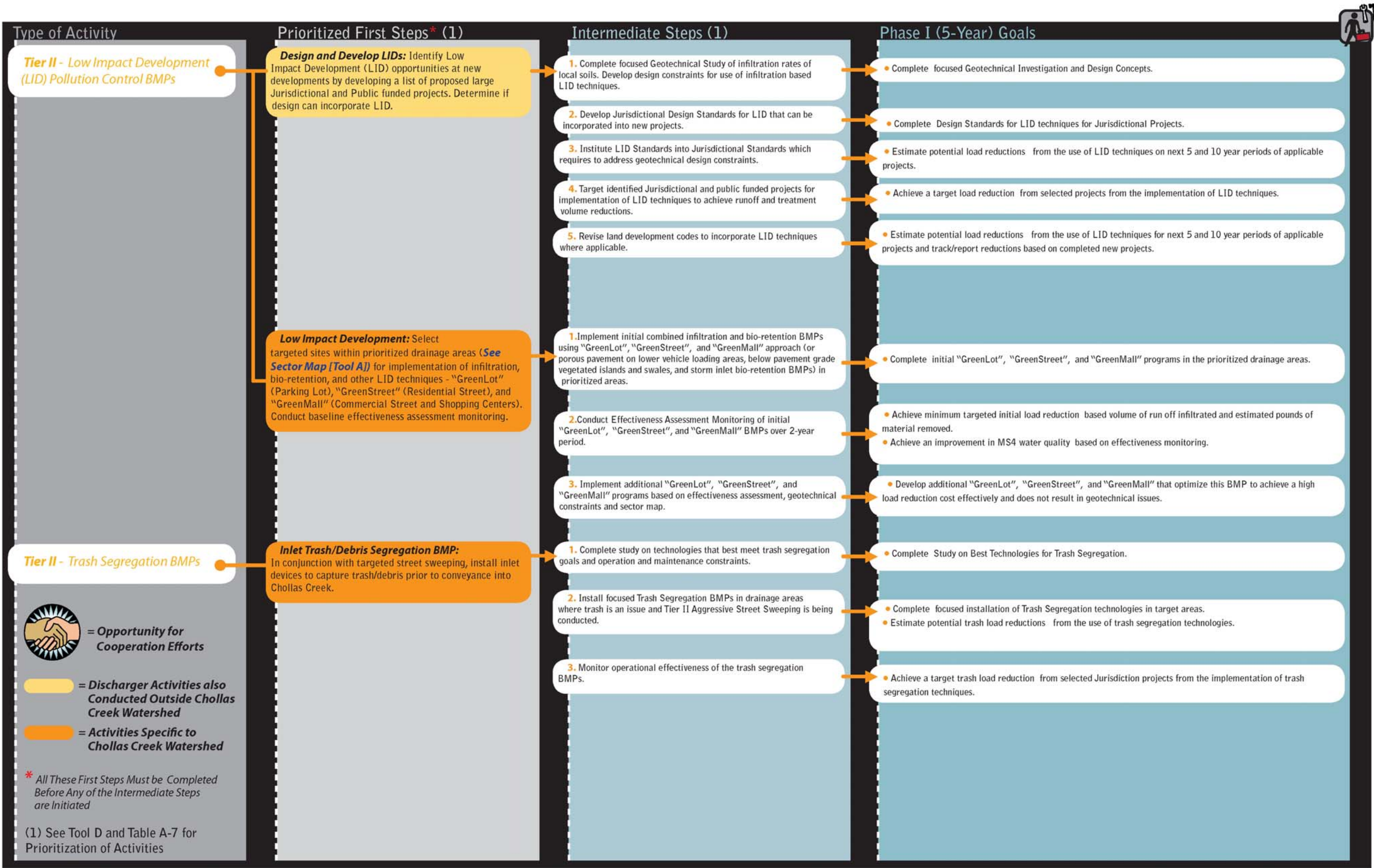


Table E-3. Steps and Goals for Implementing Tier III Activities

Type of Activity	Prioritized First Steps* (1)	Intermediate Steps (1)	Phase I (5-Year) Goals
Tier III - Targeted Dry Weather Diversions	Dry Weather Diversions: Determine priority drainage areas for Dry Weather Diversions based on Dry Weather Loadings and Effectiveness of Tier I Runoff Reduction programs. Dry Weather Diversions are not to be implemented on a wide scale, but as an option where water quality, location, sanitary sewer capacity and regulatory requirements are assessed and a target drainage area identified.	<ol style="list-style-type: none"> 1. Based on the assessment of applicability of a drainage area for this option and selection of target area(s), conduct further site specific studies to complete the design of the diversions. 2. Based on the results of the studies, complete design and sizing of the dry weather diversions. 3. Estimate load reduction to be achieved and cost to construct and operate diversions based on final design. Conduct cost benefit analysis of load reduction achieved compared to cost. Optimize design. 4. Implement dry weather diversion at selected location(s) based on prioritization strategy. 5. Conduct receiving water sampling to assess effectiveness of diversions. 	<ul style="list-style-type: none"> • Complete assessment and design studies for dry weather diversions for targeted drainage areas. • Complete design of dry weather diversions for targeted drainage areas. • Achieve minimum targeted load reduction based on volume of dry weather flows diverted and pounds of material removed based on constituent concentrations detected in dry weather samples. • Achieve targeted reduction in receiving water downstream of installed diversions.
Tier III - Bacteria Treatment BMPs	Bacteria Treatment: Identify technologies that provide for effective reduction of bacteria to achieve target reductions, considering regrowth issues. This treatment should be used in combination with other treatments in an integrated approach.	<ol style="list-style-type: none"> 1. Complete study on technologies that best meet bacteria reduction goals and operation and maintenance constraints. 2. Install focused bacteria treatment BMPs in drainage areas where bacteria is the single priority pollutant or as part of a treatment train approach to address all priority pollutant per integrated BMP strategy. 3. Monitor operational effectiveness of the bacteria treatment BMPs with regard to reducing bacteria from entering receiving water and not resulting in health hazards. 	<ul style="list-style-type: none"> • Complete Study on Best Technologies for Bacteria Reduction • Complete Focused Phase I installation of Bacteria Reduction technologies in target areas. • Estimate potential bacteria load reductions from the use of bacteria treatment BMPs • Achieve a target bacteria load reduction from selected projects from the implementation of bacteria treatment BMPs.
Tier III - Erosion and Sediment Controls and Hydro-modification BMPs	Hydromodification/Erosion and Sediment Control: Determine targeted watershed and prioritized drainage areas for erosion and sediment controls based on comparison of estimated undeveloped sediment loadings versus current load reduction requirements and requirements for reduction in hydro-modification of downstream channels. Use of this single-pollutant treatment where monitoring data indicates that sediment is the main priority pollutant or if the erosion and sediment control treatment system also addresses the other pollutants. This treatment BMP can be used in combination with other BMPs to meet integrated reduction goals.	<ol style="list-style-type: none"> 1. Based on the assessment of applicability of a drainage area for this option as a single-pollutant BMP or in combination with other BMPs as well as selection of target area(s), conduct further site specific studies to complete the design of these BMPs. 2. Based on the results of the studies, complete design and sizing of BMPs. Address hydromodification issues where applicable to control downstream channel erosion. 3. Estimate load reduction and/or peak flow mitigation to be achieved and cost to construct and operate BMPs based on final design. Conduct cost benefit analysis of load reduction achieved compared to cost. Optimize design. 4. Implement BMP at selected location(s) based on prioritization strategy. 5. Conduct receiving water sampling and channel erosion to assess effectiveness of BMP. 	<ul style="list-style-type: none"> • Complete assessment and design studies for BMPs for targeted drainage areas. • Complete design of BMPs for targeted drainage areas. • Achieve minimum targeted load reduction based on areas stabilized and/or peak flow impact reduced. • Achieve targeted reduction in receiving water downstream of installed BMPs and/or targeted reductions in stream channel modification.

= Opportunity for Cooperation Efforts

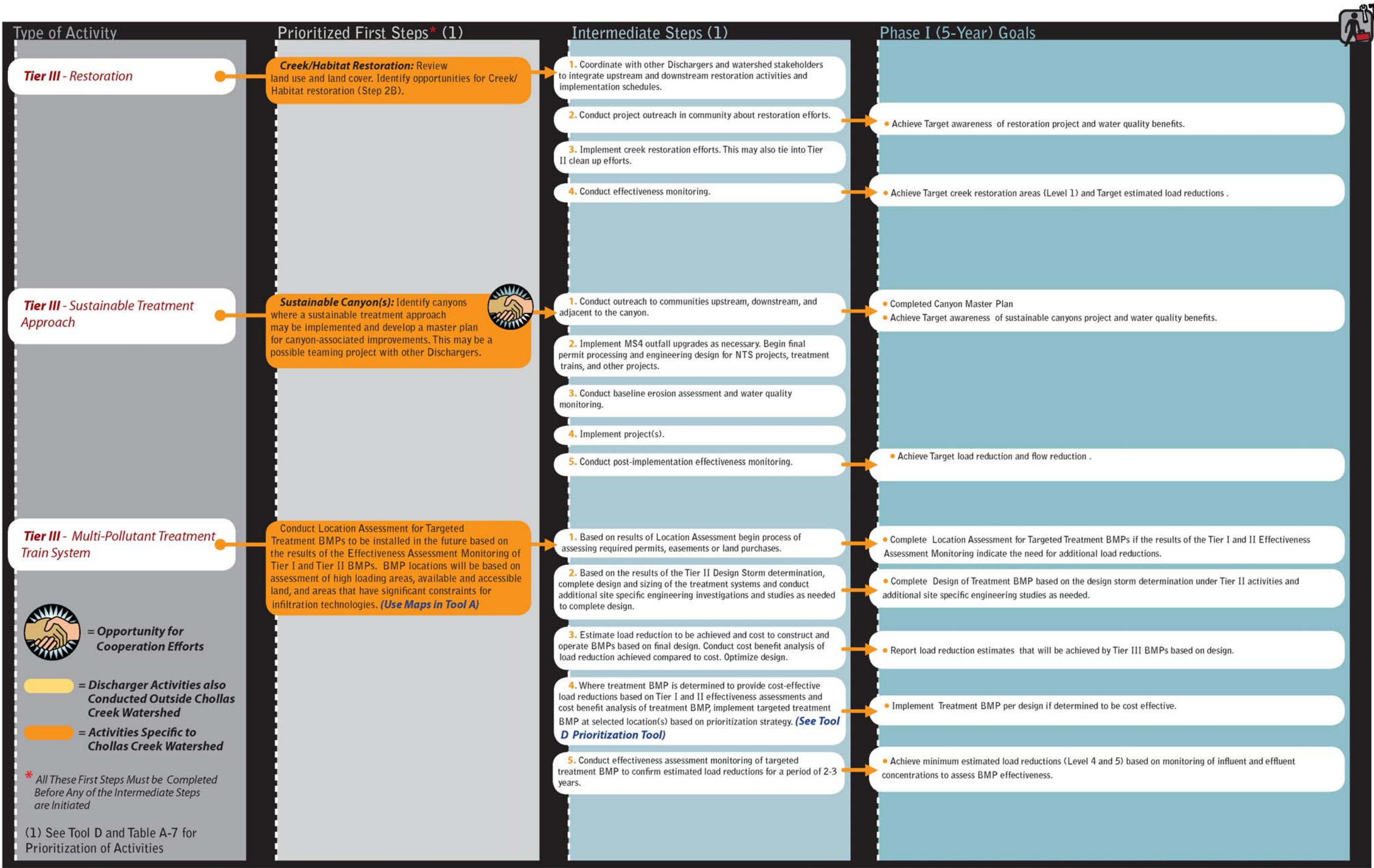
 = Discharger Activities also Conducted Outside Chollas Creek Watershed

 = Activities Specific to Chollas Creek Watershed

 * All These First Steps Must be Completed Before Any of the Intermediate Steps are Initiated

 (1) See Tool D and Table A-7 for Prioritization of Activities

Table E-3. Steps and Goals for Implementing Tier III Activities



Tool F

Assessment Framework

Chollas Creek Metals TMDL Implementation Plan

EFFECTIVENESS ASSESSMENT / RE-EVALUATION PROCESS

Dischargers must conduct effectiveness assessments for implemented activities and BMPs to address key study questions and assess the project specific goals and outcomes. Tool F develops an assessment and re-evaluation framework Dischargers will use to monitor and assess the effectiveness of implemented projects and begin planning Phase II watershed activities.

Activity effectiveness assessment process is based on the outputs and outcomes of the six Levels of Effectiveness Outcomes shown in Figure F-1. In the context of this Implementation Plan, Level 1 Outcomes typically translate into outputs, which strongly ties to Tier I education/outreach, enforcement, and effectiveness monitoring activities and Tier II special studies. Tier II and Tier III activities are typically designed to achieve a Level 4 load reduction outcome. This does not preclude outputs and outcomes being developed for different Level of Effectiveness Outcomes. Depending on how Dischargers designed project study questions and activities, the collected data may include both outcomes and outputs.

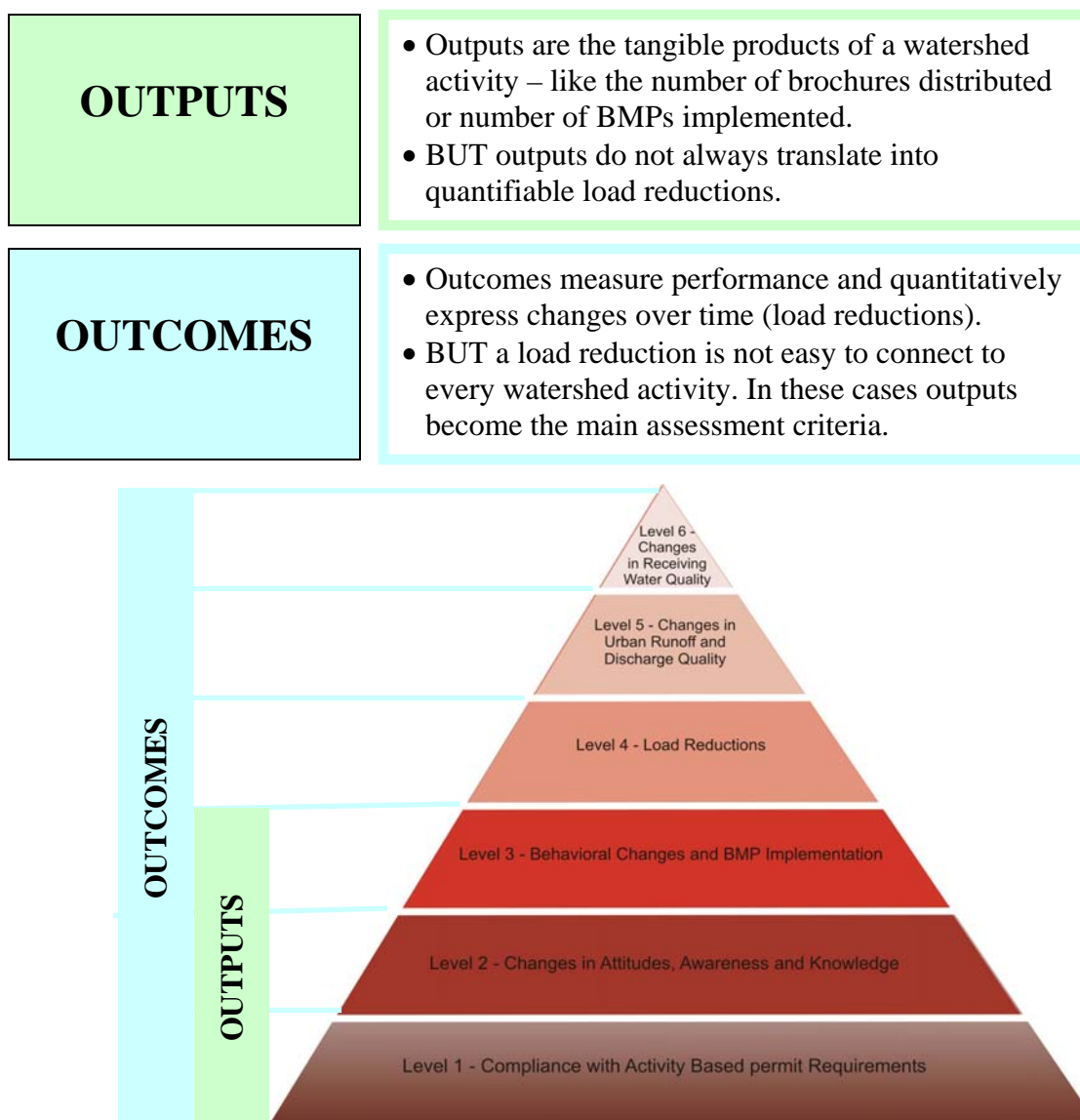
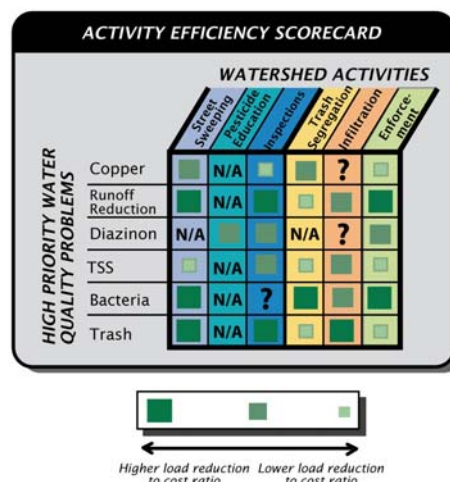


Figure F-1. Levels of Effectiveness Outcomes with Outputs and Outcomes

A key output of the Effectiveness Assessment and Re-Evaluation process was the watershed activity scorecard concept. This scorecard will allow Dischargers to make management decisions using the relative efficiency/effectiveness scores. The final watershed activity score represents the efficiency of different watershed activities typically normalized by its cost of implementation. A blank generic example of the scoring system that may be used by the Dischargers is shown in Figure F-2. As indicated in the figure, the study question (management question) and measured outcome based on the question is one of the main drivers of the assessment process. Other Dischargers may adopt the City of San Diego's system or develop another tool.



Management Questions	Status	Measured Outcome	Effectiveness Rating	Public Support	Additional Benefits	Overall Cost			Efficiency Rating	FINAL SCORE
						Planning	Implementation	Operations & Maintenance		

Figure F-2. Template for Watershed Activity Assessment Scorecard (City of San Diego)

Dischargers developed watershed activity study questions during Phase I planning and project implementation. Study questions were designed to evaluate the activity's effectiveness using as simple and straightforward an approach as possible to reduce the number of variables in the

assessment process. Based on activity specific and overall management goals, Dischargers may modify study questions for effectiveness assessment.

Possible Study Questions for Phase I:

- Is the watershed activity effective? Were the objects, goals, and effectiveness outcomes achieved? (*if not, why not?*)
- Does the watershed activity need to be modified to improve its effectiveness? (*How?*)
- Should the watershed activity be removed from the List(s) of General Activities? Or should the watershed activity and/or modified activity be implemented in additional targeted areas?

The effectiveness assessment and re-evaluation process follows the flow chart presented in Figure F-3. Dischargers used this process as a guide for developing activity specific assessment and monitoring programs for Phase I implementation and will use this same process during the planning and implementation of future program phases. The need for both effectiveness assessment and compliance monitoring was also considered in the design of the Chollas Creek TMDL Implementation Monitoring Plan (Appendix A).

- 1) Baseline assessment is necessary to define the conditions pre-project implementation. Outputs and outcomes from the project will be compared to this baseline. PWQP source identification studies will also play a significant role in this implementation plan, and therefore a study specific monitoring framework is presented in Figure F-4.
- 2) Project Implementation (see step-by-step process in Tool E).
- 3) Monitoring activities may include monitoring urban runoff and water quality. Tier I and Tier II activities may require other forms of monitoring such as results of facility inspections, surveys that assess behavior changes, number and attendance of outreach activities, etc.
- 4) Load reductions are only tabulated for activities with at least a Level 4 Effectiveness Outcome. This method of measure may be applicable for Tier II and Tier III activities, depending on design.
- 5) A – If the watershed activity answers the study questions and achieves the desired Phase I (5-year) Goal(s), monitoring of the current activity may be discontinued. The Discharger may choose to implement the activity elsewhere.

B – If the watershed activity cannot answer the study questions and/or achieve the desired Phase I (5-year) Goal(s), existing conditions and the activity should be assessed. If the cause of not achieving the target outcome can be addressed by modifying the activity or assessment approach, the Discharger may choose to implement it elsewhere. If the activity is not found effective, the Discharger may recommend removing the activity from the General List of Activities (Tool C).

A summary of the key components of the effectiveness assessment/re-evaluation process has been presented by Tier and type of watershed activity in Table F-1, Table F-2, and Table F-3. A Discharger will use this framework to define the project specific measurable outcomes, data to be collected, assessed, and reported, and overall management requirements.

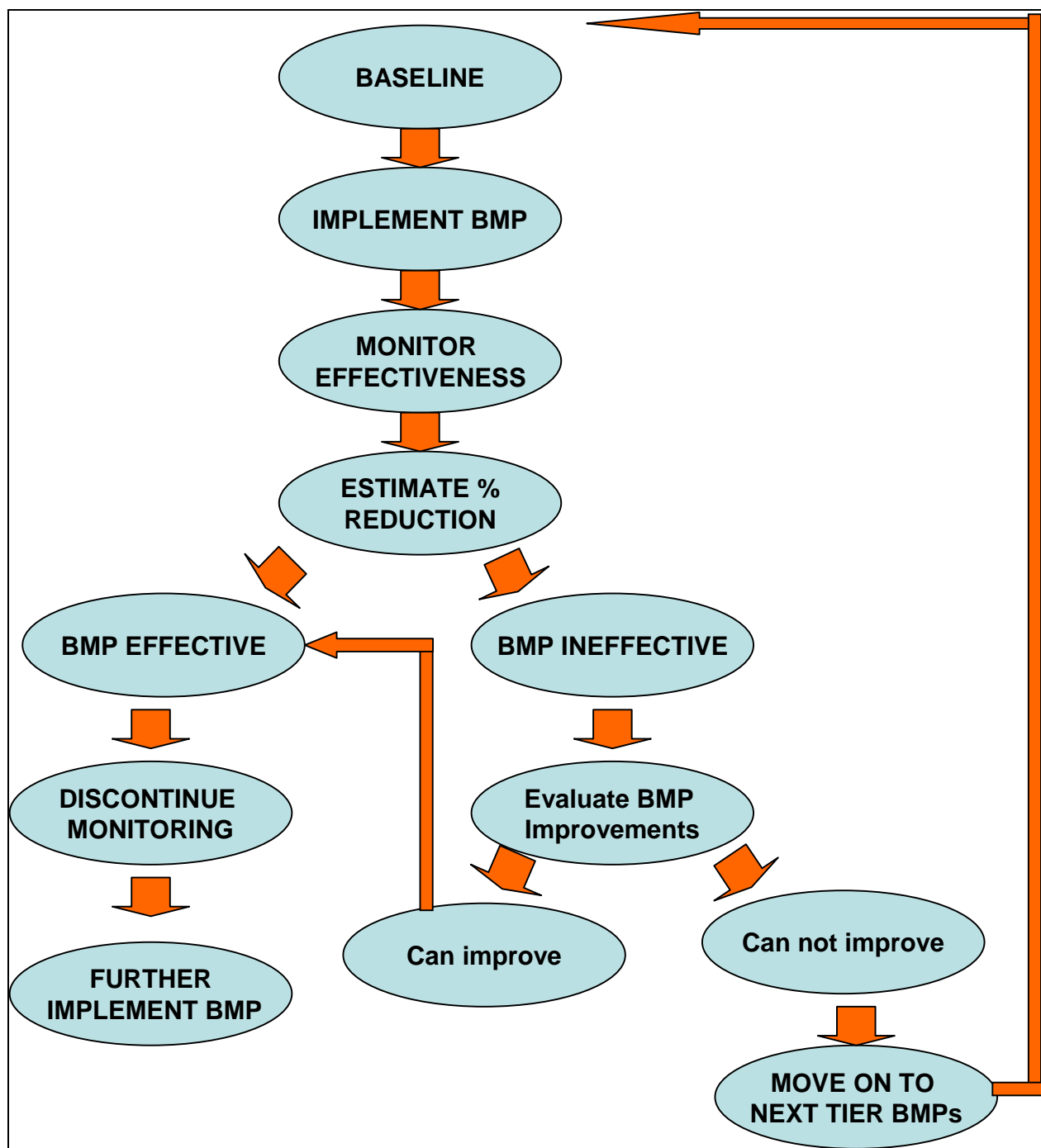


Figure F-3. BMP Effectiveness Monitoring Strategy

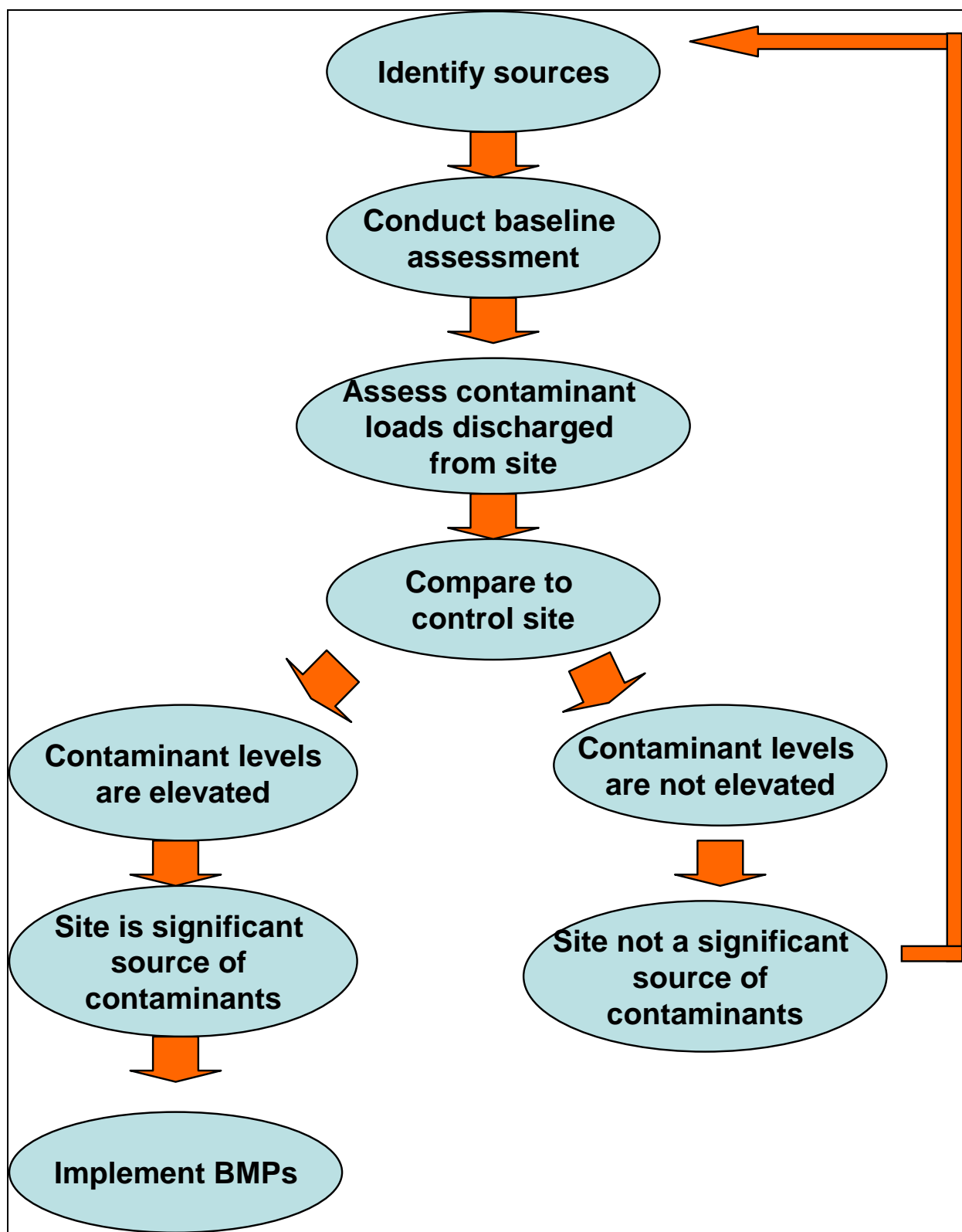


Figure F-4. Source Study Monitoring Strategy



Table F-1. Summary of Assessment Framework for Tier I Activities

TYPE OF TIER I ACTIVITY	Phase I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
General Effectiveness Assessment Regime Applicable to Any Tier I Watershed Activity	Obtain Baseline Monitoring Data to Measure Effectiveness of Tier I Activities based on Urban Runoff Quality in Targeted Areas	Level 1-6	<u>Study Questions</u> <ul style="list-style-type: none"> Did the activity result in a pollutant load reduction? <u>Management Questions</u> <ul style="list-style-type: none"> What is the cost associated with implementing the watershed activity/BMP? 	<ul style="list-style-type: none"> Number and type of coordinated jurisdictional monitoring programs. Load reduction 	<ul style="list-style-type: none"> Audit of data gaps. Compare baseline with post-implementation data.
	Coordinate Effectiveness Assessment Monitoring with other jurisdictional monitoring programs and other Discharger monitoring programs, as applicable.				
	Determine Load Reductions for Proposed Activities				
	Complete (Level I) Data Management Process to Track, Assess and Report Watershed Activities Effectiveness	Level 1		<ul style="list-style-type: none"> A database management system to track watershed activities and a data sharing process between Dischargers. 	<ul style="list-style-type: none"> Create a process where data can be compiled, managed, and shared.
Regulatory/ Legislative	Develop Data Management Process to integrate watershed data to determine Total Load Reductions and Water Quality Trends.				
	Introduce Legislation for Product Substitution into State Legislature	Level 4	<u>Study Questions</u> <ul style="list-style-type: none"> Does existing legislation prevent the incorporation of LID into codes and/or design standards? What is the load reduction associated with modifying codes/design standards? 	<ul style="list-style-type: none"> Number and type of changes in legislation which account for product substitution. 	<ul style="list-style-type: none"> Comparison of legislation over time.
	Complete and Enact (Level 1) Modified Codes	Level 1 Level 3 Level 4		<ul style="list-style-type: none"> Number of Code changes identified, recommended, and/or enacted. 	<ul style="list-style-type: none"> Comparison of Codes over time. Baseline loads compared to post-BMP implementation loads.
	Achieve Targeted Load Reductions (Level 4) based on Modifications of Practices (Level 3) as Document by Inspection Program (Jurisdiction-wide)		<u>Management Questions</u> <ul style="list-style-type: none"> What is the cost associated with lobbying for state-wide legislative changes? How long is the code modification process? 	<ul style="list-style-type: none"> Number and type of LID standards are incorporated into Jurisdictional Design Standards. LID standards are incorporated into SUSMP. 	<ul style="list-style-type: none"> Comparison of design standards over time.
Outreach/ Education	Completion and incorporation (Level 1) of LID Standards into Jurisdictional Design Standards, where Applicable	Level 1			
	Completion and incorporation (Level 1) of LID Standards into SUSMP, where Applicable				
Outreach/ Education	Complete (Level 1) Updates to Source Inventories and Database in Targeted Areas	Level 1	<u>Study Questions</u> <ul style="list-style-type: none"> What types of education/ outreach result in changes in awareness and/or changes in behavior? What is the load reduction associated with education/ 	<ul style="list-style-type: none"> Number of Changes to Source Inventory Lists and/or Source Maps (Tool A). Percent increase/decrease in Sources (by source type) in Source Inventory Lists and/or Source Map (Tool A). 	<ul style="list-style-type: none"> Compare Source Maps across Years and/or Phases of Implementation Plan, as appropriate.
	Complete (Level 1) Updates to Source Inventories and Database in Expanded Targeted Areas				



Table F-1. Summary of Assessment Framework for Tier I Activities

TYPE OF TIER I ACTIVITY	Phase I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
	<p>Achieve Awareness (Level 2) of proposed and implemented Code changes and of measures to reduce pollutants for Facilities and Residences in Targeted Area(s)</p> <p>Achieve Behavioral Change (Level 3) above Benchmark Percentage of Targeted Facilities and Residences</p> <p>Obtain above Benchmark estimated load reduction in MS4 (Level 5) in Targeted Area(s) for Prioritized Pollutants based on Effectiveness Monitoring</p>	<p>Level 2</p> <p>Level 3</p> <p>Level 5</p>	<p>outreach efforts?</p> <ul style="list-style-type: none"> What is the added benefit of CBSM? <p><u>Management Questions</u></p> <ul style="list-style-type: none"> What is the cost associated with implementing education/ outreach (and/or CBSM)? What frequency of education/ outreach results in optimal results? 	<ul style="list-style-type: none"> Number and type of Outreach materials distributed. Number of participants. Inspection results. 	<ul style="list-style-type: none"> Compare Baseline results to post program results. Comparison to include outreach materials and behavioral surveys. Conduct inspections and event monitoring pre and post activity implementation.
Enforcement	<p>Complete (Level 1) Inspections of Current Target Sources and Obtain Monitoring Data from Industrial Facilities to Estimate Loadings</p> <p>Achieve Targeted Load Reductions (Level 4) based on Number of Increase Inspections in Targeted Areas and Modifications of Practices (Level 3) with Enforcement of Modified Codes</p>	<p>Level 1</p> <p>Level 3</p> <p>Level 4</p>	<p><u>Study Questions</u></p> <ul style="list-style-type: none"> What is the load reduction achieved through inspections? <p><u>Management Questions</u></p> <ul style="list-style-type: none"> What is the cost associated with inspections? What frequency of inspection results in optimal results? Does enforcement work more or less effectively when combined with education? What types of education? 	<ul style="list-style-type: none"> Inspection results from full facility inspections. Estimated loadings from monitoring data from industrial facilities, where data is available and appropriate QA/QC has been documented. Load reduction attributable to inspections and enforcement. 	<ul style="list-style-type: none"> Comparison of inspection logs before and after BMP implementation. Baseline versus post-BMP implementation monitoring data.
	<p>Achieve Estimated Load Reduction (Level 4) based on Targeted Percentage of New Construction and Roadway Improvements that can Apply LID Techniques</p>	<p>Level 4</p>		<ul style="list-style-type: none"> Percentage of construction projects where LID has been implemented. Numeric target set by Discharger as part of activity planning. Measurable load reduction at construction and roadway sites. 	<ul style="list-style-type: none"> Comparison of Baseline water quality results compares to post-BMP implementation monitoring data.
Special Studies	<p>Complete (Level 1) Source Study of Targeted pollutant(s) and report findings to other Dischargers.</p> <p>Determine actual loadings (Level 4) and estimate potential load reductions from Tier I BMPs to assess need for additional management actions.</p> <p>Complete (Level 1) additional Source Study of Targeted pollutant(s) and report findings to other Dischargers.</p>	<p>Level 1</p> <p>Level 4</p>	<p><i>See the list of potential special studies in the Data Gap Table (TABLE 5-1).</i></p>	<ul style="list-style-type: none"> Identification of key sources of contamination, and corroborated with loading calculation, as applicable. A Source study identifying key sources of contamination. Load calculations for by sources, pollutants, and BMPs. 	<ul style="list-style-type: none"> Field reconnaissance and water quality monitoring and grab sampling to complete a final Source ID report complete with loading calculations and pollutant sources.



Table F-1. Summary of Assessment Framework for Tier I Activities

TYPE OF TIER I ACTIVITY	Phase I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
	Determine actual loadings (Level 4) and estimate potential load reductions from Tier I BMPs to assess need for additional management actions.				
	Complete (Level 1) design storm study. Complete (Level 1) determination of estimated load reductions to be achieved under the design storm approach.	Level 1		<ul style="list-style-type: none"> An understanding of storms and pollutant loadings in Chollas Creek. Recommended design storm and associated achievable pollutant loadings and/or load reductions. 	<ul style="list-style-type: none"> Field reconnaissance and pollutograph monitoring to complete range of pollutant load calculations and estimated achievable load reductions for various design storms.



Table F-2. Summary of Assessment Framework for Tier II Activities

TYPE OF TIER II ACTIVITY	PHASE I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
General Effectiveness Assessment Regime Applicable to Any Tier II Watershed Activity	<p>Complete Study on Best Technologies for Tier II BMP</p> <p>Complete Location Assessment for BMPs, pilot studies, and other Tier II watershed activities</p> <p>Achieve target public awareness of Tier II watershed activity.</p> <p>Monitor influent and effluent concentrations, flow rates, and gross pollutants to assess effectiveness of the BMP and verify estimated load reductions.</p>	Level 1-6	<p><u>Study Questions</u></p> <ul style="list-style-type: none"> What is the load reduction associated with the watershed activity/BMP? <p><u>Management Questions</u></p> <ul style="list-style-type: none"> What is the cost associated with implementing the watershed activity/BMP? 	<ul style="list-style-type: none"> Number and type of Outreach materials distributed. Number of participants in incentive programs / number of BMPs distributed as part of incentive program. Units of pollutants, debris, trash, runoff, etc. removed. Load and flow reductions. 	<ul style="list-style-type: none"> Comparison of Baseline versus post-BMP implementation monitoring.
Targeted Aggressive Street Sweeping	<p>Complete (Level 1) Phase I Aggressive Street Sweeping programs in the prioritized drainage areas within the targeted watersheds.</p> <p>Develop a Phase II Sweeping Program that optimizes sweeping to achieve a high load reduction cost effectively.</p> <p>Achieve minimum targeted Phase I load reduction (Level 4) based on pounds of material removed and constituent concentrations detected in debris samples.</p> <p>Achieve an improvement in MS4 water quality (Level 5) based on Phase I effectiveness monitoring.</p>	Level 1 Level 4 Level 5	<p><u>Study Questions</u></p> <ul style="list-style-type: none"> What is the load reduction associated with aggressive street sweeping? What is the public response to the program? <p><u>Management Questions</u></p> <ul style="list-style-type: none"> What is the cost associated with aggressive street sweeping? What O&M is required? What is the optimal sweeping technology? What is the optimal sweeping frequency? 	<ul style="list-style-type: none"> Development of a street sweeping program with high load reduction (increased frequency of sweeping, increased area of sweeping, sweeping with newer technology, etc). Number of streets swept in priority areas under Phase I program. Number of pounds of material removed through street sweeping. Improved MS4 water quality. 	<ul style="list-style-type: none"> Plan for street sweeping with assessment using field surveys of sweeping activities. Debris quality and quantity monitoring program. Urban runoff/water quality measurements at the MS4 stations.



Table F-2. Summary of Assessment Framework for Tier II Activities

TYPE OF TIER II ACTIVITY	PHASE I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
Low Impact Development Pollution Control BMPs	Complete (Level 1) Focused Geotechnical Investigation and Design Constraints Complete (Level 1) Design Standards for LID techniques for projects. Estimate potential load reductions (Level 4) from the use of LID techniques on next 5 and 10 year periods for applicable jurisdictional projects Achieve a target load reduction (Level 4) from selected projects from the implementation of LID techniques. Estimate potential load reductions (Level 4) from the use of LID techniques on next 5 and 10 year periods of applicable new development projects	Level 1 Level 4	<u>Study Questions</u> <ul style="list-style-type: none"> What are the flow and load reductions associated with LID BMPs? <u>Management Questions</u> <ul style="list-style-type: none"> What is the cost associated with designing and implementing LID BMPs? What O&M is required? 	<ul style="list-style-type: none"> Geotechnical design constraints (infiltration rate, etc). Number, type of proposed and implemented changes to jurisdictional Design Standards. Percent load reduction from projects due to LID implementation. Estimated load reduction due to LID implementation over 5 and 10 year periods (multiple plan phases). 	<ul style="list-style-type: none"> Literature review of geotechnical conditions and/or field geotechnical assessment with report. Comparison of Baseline versus post-BMP implementation monitoring.
	Complete (Level 1) Phase I “Green Streets,” Green Lots” and/or “Green Malls” programs in the prioritized areas. Develop a Phase II “Green Streets,” Green Lots” and/or “Green Malls” project package that optimizes these BMPs to achieve a high load reduction cost effectively and does not result in geotechnical issues. Achieve minimum targeted Phase I load reduction (Level 4) based volume of run off infiltrated and estimated pounds of material removed. Achieve an improvement in MS4 water quality (Level 5) based on Phase I effectiveness monitoring.	Level 1 Level 4 Level 5		<ul style="list-style-type: none"> Number of “Green Streets,” Green Lots” and/or “Green Malls” programs successfully implemented within Discharger’s jurisdiction. Point of diminishing returned for number of “Green Streets,” Green Lots” and/or “Green Malls” BMPs with high load reduction and no geotechnical issues. Load reduction. Pound of target pollutant removed. Volume of runoff infiltrated. Improved MS4 water quality. 	<ul style="list-style-type: none"> BMP Effectiveness monitoring Flow volume and water quality assessments. MS4 water quality assessment.



Table F-3. Summary of Assessment Framework for Tier III Activities

TYPE OF TIER III ACTIVITY	PHASE I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
General Effectiveness Assessment Regime Applicable to Any Tier III Watershed Activity	Complete Study on Best Technologies for Tier III BMP	Level 1-6	<u>Study Questions</u> <ul style="list-style-type: none"> What is the load reduction associated with the watershed activity/BMP? <u>Management Questions</u> <ul style="list-style-type: none"> What is the cost associated with implementing the watershed activity/BMP? What O&M is needed for the watershed activity/BMP? 	<ul style="list-style-type: none"> Report summarizing BMP technologies. Report to include design specifications (design standards) for implementation. Number of locations identified for Tier III BMPs (desktop assessment) and minimum of 90% of sites field assessed for project implementation. Number of successfully implemented Tier III BMPs. Final design specifications for Tier III BMPs. Baseline water quality conditions. Load reduction calculations as per design. 	<ul style="list-style-type: none"> Field investigation of project sites and creation of site specific design specifications to be incorporated into final engineering design. Conceptualization of BMP design and identification of construction and permitting requirements. Tables of statistically validated load reduction achievements by Tier III BMPs. Cost/benefit assessment including flow reduction water quality assessments. Monitor influent and effluent concentrations to assess effectiveness.
	Complete Location Assessment for Phase I Treatment BMPs if the results of the Tier I and II Effectiveness Assessment Monitoring indicate the need for additional load reductions.				
	Complete Design of Treatment BMP based on the design storm determination under Tier II activities and additional site specific engineering studies as needed.				
	Estimate load reductions that will be achieved by Tier III BMP based on design.				
	Implement Treatment BMP per design if determined to be cost effective				
Targeted Dry Weather Diversions	Monitor influent and effluent concentrations to assess effectiveness of the BMP and verify estimated load reductions.	Level 1 Level 4 Level 6	<u>Study Questions</u> <ul style="list-style-type: none"> What are the flow and load reductions associated with dry weather diversions? <u>Management Questions</u> <ul style="list-style-type: none"> What is the cost associated with designing and installing dry weather diversions? What O&M is needed for a dry weather diversion? 	<ul style="list-style-type: none"> Final design specifications for dry weather diversions. Number of successfully installed dry weather diversions. Load reduction from baseline dry weather flows and storm pollutant loads. Pollutant load reduction in receiving waters. 	<ul style="list-style-type: none"> Baseline and post-BMP implementation flow and water quality monitoring.
	Complete (Level 1) assessment and design studies for dry weather diversions for targeted drainage areas.				
	Complete (Level 1) design of dry weather diversions for targeted drainage areas.				
	Complete (Level 1) Focused Phase I installation of dry weather diversions in target areas.				
	Achieve minimum targeted load reduction (Level 4) based on volume of dry weather flows diverted and pounds of material removed based on constituent concentrations detected in dry weather samples.				
	Achieve targeted reduction in receiving water (Level 6) downstream of installed diversions.				



Table F-3. Summary of Assessment Framework for Tier III Activities

TYPE OF TIER III ACTIVITY	PHASE I (5-YEAR) GOALS	LEVEL OF EFFECTIVENESS	POTENTIAL PROJECT QUESTIONS	POTENTIAL METHOD OF MEASUREMENT	ASSESSMENT PROCESS
Erosion and Sediment Controls and Hydromodification BMPs	<p>Complete (Level 1) assessment and design studies for BMPs for targeted drainage areas.</p> <p>Complete (Level 1) design of BMPs for targeted drainage areas.</p> <p>Achieve minimum targeted load reduction (Level 4) based on areas stabilized and/or peak flow impact reduced.</p> <p>Achieve targeted reduction in receiving water (Level 6) downstream of installed BMPs and/or targeted reductions in stream channel modification.</p>	<p>Level 1</p> <p>Level 4</p> <p>Level 6</p>	<p><u>Study Questions</u></p> <ul style="list-style-type: none"> What is the erosion/scour reduction associated with erosion and sediment controls? What is the load reduction associated with these BMPs? <p><u>Management Questions</u></p> <ul style="list-style-type: none"> What is the cost associated with designing and installing dry weather diversions? What O&M is needed for a dry weather diversion? 	<ul style="list-style-type: none"> Report summarizing erosion control technologies. Report to include design specifications for implementation. Number of successfully installed erosion control technologies. Erosion reduction in receiving waters downstream of BMPs. 	<ul style="list-style-type: none"> Baseline and post-BMP implementation monitoring of erosion and sediment concentrations in flow.
Sustainable Treatment Approaches	<p>Complete (Level 1) canyon master plan for canyon-associated improvements.</p> <p>Achieve (Level 2) target awareness of sustainable canyon project(s) and water quality benefits.</p> <p>Achieve minimum targeted erosion, load and flow reductions (Level 4).</p>	<p>Level 1</p> <p>Level 2</p> <p>Level 4</p>	<p><u>Study Questions</u></p> <ul style="list-style-type: none"> What is the erosion/scour reduction associated with sustainable canyons design? What are the flow and load reductions associated sustainable canyons? How does the public react to the sustainable canyons concept? <p><u>Management Questions</u></p> <ul style="list-style-type: none"> What is the cost associated with sustainable canyons? What O&M is needed? 	<ul style="list-style-type: none"> Canyon master plan. Number and type of Outreach materials distributed. Erosion reduction in canyon and receiving waters downstream of canyon BMPs. Vegetation type in canyon. Load reduction from baseline storm flows. 	<ul style="list-style-type: none"> Baseline and post-BMP implementation monitoring of canyon erosion and pollutant concentrations in flow. Baseline and post-BMP vegetation survey.